

Workstream:

Mobility

NCDOT  
TMT  
MOBILITY  
WORKSTREAM  
Implementation Plan  
May 2008

# TMT Mobility Workstream

Team:

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November 5, 2007 <sub>1</sub>

# NCDOT Mission & Goal

- *Connect people and places in NC - safely and efficiently, with accountability and environmental sensitivity*
- *Make our transportation network move people and goods more efficiently*

# Multi-modal Problem

## Dove Deeper on Highway Side

- Challenges & Solutions
- 30 Days
- Expertise of Team

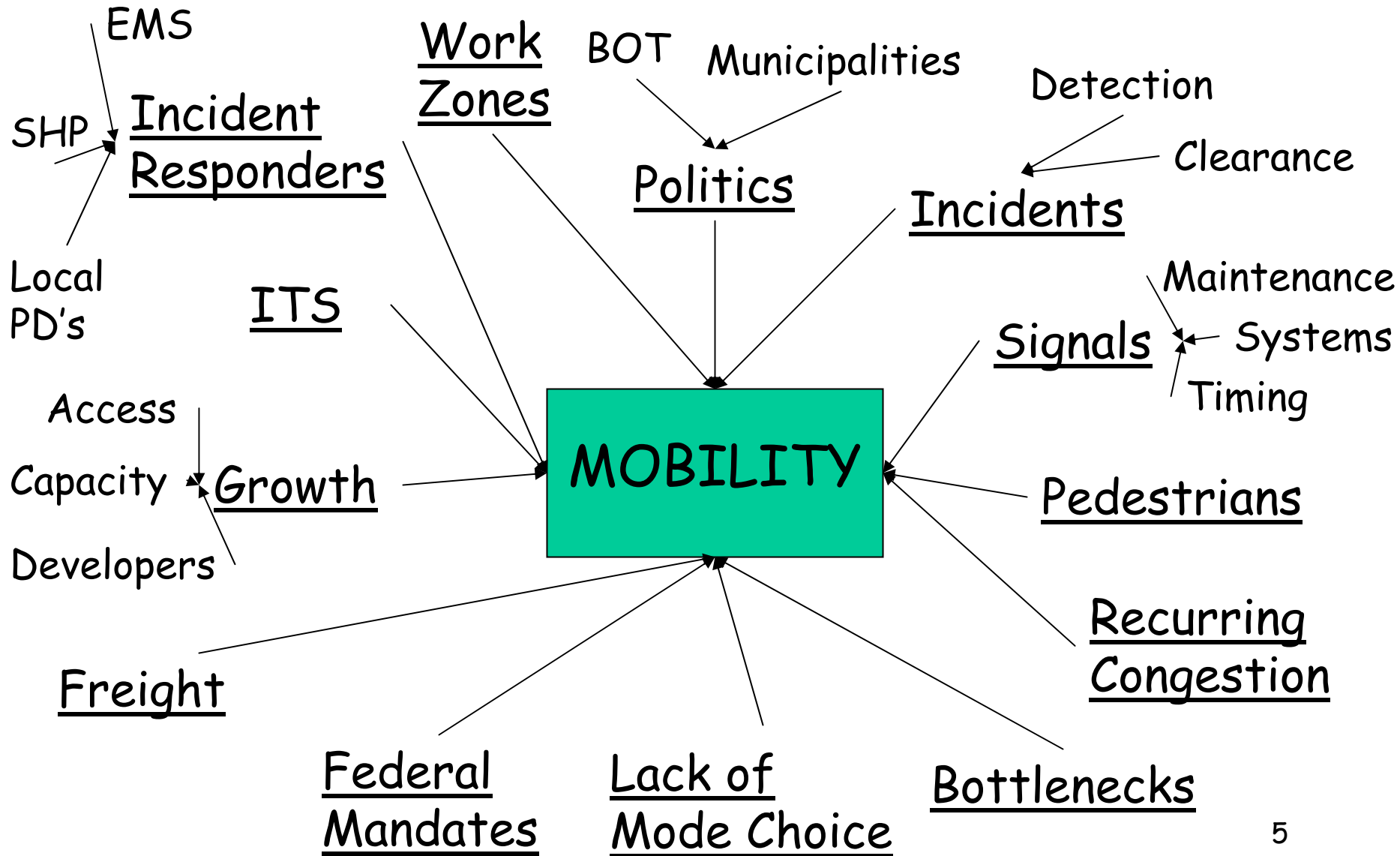
# Advancing Transportation to the 21<sup>st</sup> Century

**OLD MODEL:** Build or widen highways

**NEW APPROACH:** Multi-modal Systems Operations

## Making the Case

# Friends & Foes



# Mobility Pilot Goals

- Define & measure Mobility
- Identify congestion solutions (Toolbox)
- Evaluate Efficiency and Effectiveness of current mobility management resources
- Case Study: Clayton Bypass



# Outreach

## Interviewed Representatives From

- Divisions 3, 5, 7, 9, 10, & 14
- ITS Units (Traffic & Operations)
- Work Zone Traffic Control Unit
- TPB & PDEA
- Kimley-Horn
- Rail Division

# Mobility Pilot Goals

- **Define & measure Mobility**
- Identify congestion solutions (Toolbox)
- Evaluate Efficiency and Effectiveness of current mobility management resources
- Case Study: Clayton Bypass

# What is Mobility?

Ability to move people and goods from point A to point B efficiently

- Directly impacts economic well being and quality of life
- Relevant in all modes

# What is Mobility?

Crashes: Safety

as

Congestion: Mobility

**Congestion: Travel time in excess of that normally incurred under light or free-flow conditions.**

# Travel Time Index and Reliability

$$\text{Travel Time Index} = \frac{\text{Measured Travel Time}}{\text{Calculated Travel Time}}$$

Reliability: How likely you are to get to your destination "on time"

# Proposed Travel Time Index Targets

Time Period	Measure	Good	Acceptable	Needs Improvement
Off Peak	Travel Time Index	$\leq 1.0$ $\leq 60$ min	1.0-1.2 60-72 min	$> 1.2$ $> 72$ min
Peak	Travel Time Index	$\leq 1.1$ $\leq 66$ min	1.1-1.25 66-75 min	$> 1.25$ $> 75$ min

- Peak times will vary depending on mode and facility
- Example: 60 minutes estimated travel time (i.e. Raleigh to Burlington)
- Similar exercise for Reliability

# Measuring Mobility - Issues

## How to measure

- Freeway & Arterial
- Rail, Transit, Ferry, & Air
- Sampling Size & Frequency
- Methodologies - manual, automated
- Definition of Peak Period

# Mobility Pilot Goals

- Define & measure Mobility
- **Identify congestion solutions (Toolbox)**
- Evaluate Efficiency and Effectiveness of current mobility management resources
- Case Study: Clayton Bypass



# Mobility Toolbox

TMC Operations

Ramp Metering

Lane Control

Managed Lanes

Ramp Closures

Bottleneck Removal

Parking Restrictions

Congestion Pricing & HOT

HOV

Truck Transponders

Transit Signal Priority

Subsidized Fares

Truck Restrictions

Truck Weigh in Motion

Tolling

Widening

Incident Management

Real Time Traveler Information

Work Zone Management

Variable Speed Limits

Road Weather Info Systems

Access Management

Geometric Improvements

Intersection Improvements

Changeable Lane Assignment

Sig. Retiming/Optimization

Real Time Transit Info

New Bus Routes

Advanced Sig. Systems

Demand Management

New Location

Grade Separation

# Tools Used "Often"

## **TMC Operations**

Ramp Metering

Lane Control

Managed Lanes

Ramp Closures

Bottleneck Removal

Parking Restrictions

Congestion Pricing & HOT

HOV

Truck Transponders

Transit Signal Priority

Subsidized Fares

Truck Restrictions

Truck Weigh in Motion

Tolling

## **Widening**

Incident Management

Real Time Traveler Information

Work Zone Management

Variable Speed Limits

Road Weather Info Systems

Access Management

## **Geometric Improvements**

## **Intersection Improvements**

Changeable Lane Assignment

Sig. Retiming/Optimization

Real Time Transit Info

New Bus Routes

## **Advanced Sig. Systems**

Demand Management

## **New Location**

Grade Separation

# Tools Used "Sometimes"

## TMC Operations

Ramp Metering

Lane Control

Managed Lanes

Ramp Closures

Bottleneck Removal

Parking Restrictions

Congestion Pricing & HOT

HOV

Truck Transponders

Transit Signal Priority

Subsidized Fares

## Truck Restrictions

Truck Weigh in Motion

Tolling

Widening

## Incident Management

Real Time Traveler Information

Work Zone Management

Variable Speed Limits

Road Weather Info Systems

Access Management

Geometric Improvements

Intersection Improvements

Changeable Lane Assignment

Sig. Retiming/Optimization

Real Time Transit Info

New Bus Routes

Advanced Sig. Systems

Demand Management

New Location

Grade Separation

# Tools Used "Rarely"

TMC Operations

Ramp Metering

Lane Control

Managed Lanes

Ramp Closures

Bottleneck Removal

Parking Restrictions

Congestion Pricing & HOT

HOV

Truck Transponders

Transit Signal Priority

Subsidized Fares

Truck Restrictions

Truck Weigh in Motion

Tolling

Widening

Incident Management

Real Time Traveler Information

Work Zone Management

Variable Speed Limits

Road Weather Info Systems

Access Management

Geometric Improvements

Intersection Improvements

Changeable Lane Assignment

Sig. Retiming/Optimization

Real Time Transit Info

New Bus Routes

Advanced Sig. Systems

Demand Management

New Location

Grade Separation

# Tools "Not Used to Date"

TMC Operations

**Ramp Metering**

Lane Control

Managed Lanes

Ramp Closures

Bottleneck Removal

Parking Restrictions

**Congestion Pricing & HOT**

HOV

Truck Transponders

**Transit Signal Priority**

**Subsidized Fares**

Truck Restrictions

Truck Weigh in Motion

Tolling

Widening

Incident Management

Real Time Traveler Information

Work Zone Management

Variable Speed Limits

Road Weather Info Systems

Access Management

Geometric Improvements

Intersection Improvements

Changeable Lane Assignment

Sig. Retiming/Optimization

**Real Time Transit Info**

New Bus Routes

Advanced Sig. Systems

Demand Management

New Location

Grade Separation

# Mobility Toolbox-Issues

- Only a partial inventory
- Needs to be multi-modal
- Create for each
  - What
  - When
  - How
- Identify and standardize on analysis tool to analyze effectiveness and B/C of the strategies on a need-by-need basis

# Mobility Pilot Goals

- Define & measure Mobility
- Identify congestion solutions (Toolbox)
- **Evaluate Efficiency and Effectiveness of current mobility management resources**
- Case Study: Clayton Bypass

# From's & To's

- Planning and Prioritization
- Planning and Design
- Operations
- Data



# Planning and Prioritization

## FROM

- **Planning and operating** the transportation **system** network is not a priority
- Some decisions made without sufficient network insight into **adverse effects** on mobility (i.e. access management)
- **Schedules/lettings/designs** are not coordinated (e.g. alternate routes for US 1 widening project)



## TO

- Cultural change to make NCDOT **accountable** for planning and operating a multi-modal transportation **system (prioritization)**
- Decision makers aware of statewide mobility goals and understand effects of decisions
- Greatly improved prioritization and coordination between business units; stakeholders involved from cradle to grave

# Planning and Design

## FROM

- Planning and Design solutions are mostly single mode (usually pavement-based) 24x7 capacity increases
- ITS solutions incorporated on a "per project basis"; does not allow for
  - prioritization
  - systemization
  - economies of scale



## TO

- Use and grow multi-modal "toolbox" with sound analysis tools to select cost-effective congestion mitigation strategies
- Analyze statewide mobility as a system, not on individual projects
- Consider and appropriately resource asset management, especially operation and maintenance

# Operations

## FROM

- Existing operational strategies are not being used effectively (IMAP, rail, signal system timing, DMS, 511, etc.)
  - Benefits are not quantified
  - Not a priority
  - Limited resources (i.e. temporary positions)



## TO

- Existing systems running optimally and serving our customers through bold shared metrics

# Data

## FROM

—“Mobility” Data is not

- driven by needs
- used to define needs
- easily accessible to all Business Units
- used to make decisions

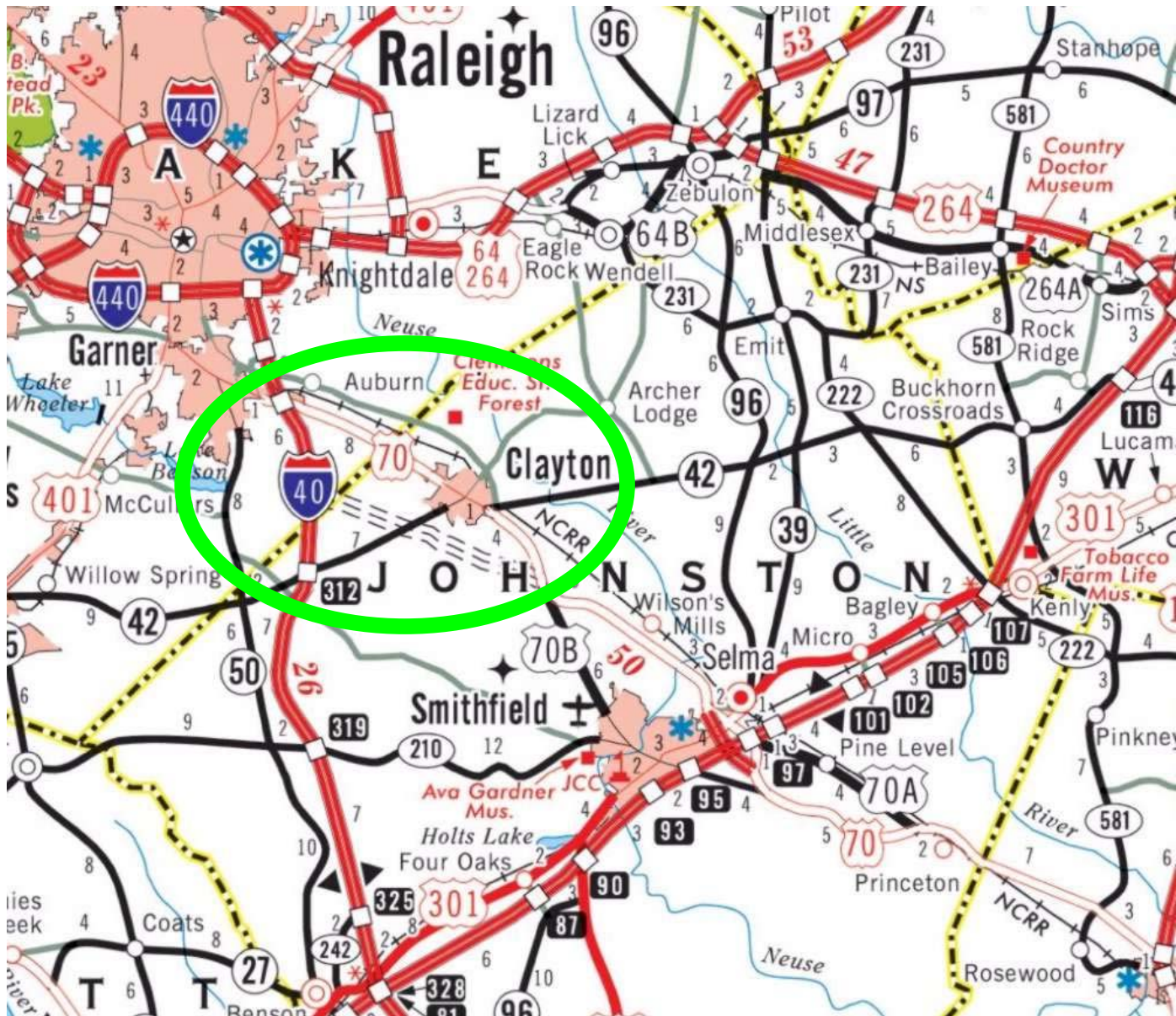


## TO

- Have real time and archived “mobility” data readily available to all and used to drive decision making

# Mobility Pilot Goals

- Define & measure Mobility
- Identify congestion solutions (Toolbox)
- Evaluate Efficiency and Effectiveness of current mobility management resources
- **Case Study: Clayton Bypass**



# Clayton Bypass - The Facts

- Symptomatic of Statewide Problem
- US-70 is a Strategic Highway Corridor
- Opening Year: I-40 Peak Hour LOS = F
- Only apparent solution: Widen I-40  
\$37M : funding not available
- No one entity was accountable for the network mobility effect on system

# Clayton Bypass

## FROM

- Project was designed to get traffic around Clayton on congested US 70
- Dumps bypass traffic onto already congested I-40 approaching Beltline.
- Issues over
  - Pushing ITS to 2010 to save \$\$\$
  - Total problem split between 2 Divisions - construction/operations

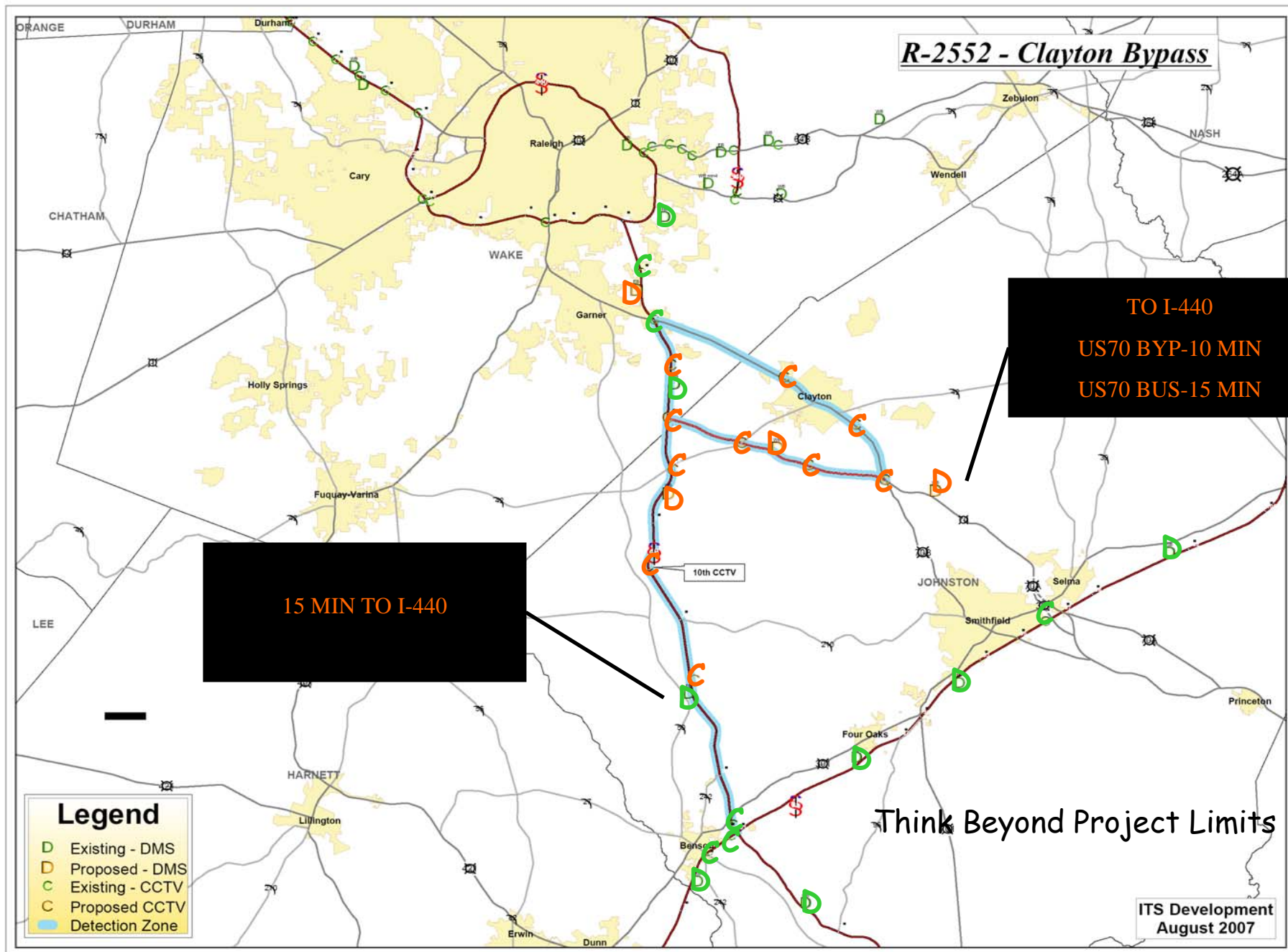


# Clayton Bypass Pilot Project

## Interim Fix (multi-disciplinary team)

- Traffic Sensors giving real time travel information for the area.
  - Provide expectations for I-40 traffic
  - Provide travel info for commuter traffic to make a choice
- Proactive public education and information plan.
  - Managing Expectations ...
  - Focusing on the Positive
    - "You Now Have a Choice"
    - Touting Environmental Features
- IMAP along I-40, US 70 Bypass, and US 70.

Recurring issue: Need Resources to support 2008 needs!



# TO Clayton Bypass

- SPOT would designate \$X Million to Modernization/Expansion... Mobility
- Systems Management Team would
  - Identify need as moving people and goods (logistics) from Johnston Co and points east & to Raleigh area and points west
  - Consider connectivity when people and goods get to end of mode
  - Look at toolbox to ID solutions
    - Optimize Existing Capacity (i.e. Improve Systems Operations): Traveler Info, IM, Non-24x7 Solutions
    - Decrease Demand: Work with large employers
    - Increase Capacity: Rail, Transit, Highway

# Team Recommendations: Ultimate

## Create Systems Management Team

- Main Focuses
  - Accountability for Mobility
  - Statewide and Regional Tiers (Multi-modal)
- Main Functions
  - Planning
  - Design
  - Operations
  - Data Management

# Team Recommendations: Ultimate

## **Create Systems Management Team**

- Main Needs
  - Adequate Funding
  - Appropriately bold metrics
  - Sound prioritization strategy

# Team Recommendations: Interim

## **Assign Multi-modal "Systems Management" FTE**

- Implement Operations Performance Measures for Mobility
- Begin Sampling Mobility/Determine Baseline Mobility Targets
- Begin Reporting Both by Divisions
  - Geographically and by Mode
- Look Beyond Highways
- Manage Expectations

# Team Recommendations: Interim

## Phased-In Wins with Metrics

- Arterial Management
  - Implement Findings of 2001 Traffic Signal Study
  - Use/enforce existing mobility policies and guidance (i.e. access management)
  - Restore funding levels (R-4701 & R-4049)
- Freeway Management
  - Implement 24x7 Detection on Statewide Tier
  - Implement 24x7 IMAP on Interstate
  - Make SHP Accountable to Incident Clearance Goals on Interstates

# Next Steps

- Fill Systems Management FTE
- Implement "Phased-in Wins" with Metrics
- Phase in the Systems Management Team



Questions?

# TMT Mobility Workstream

For SMC

November 3, 2008

# Recommendations

- Create Systems Management Group (SMG)
- Task SMG to implement recommendations of Mobility Workstream
  - Measure Mobility
  - Develop Mobility Toolbox
  - Implement Systems Management Functions

# Why Mobility Matters

- Quality of Life: safety, security, health, productivity, economic vitality, air & water quality
- Growth
  - 3.6 M new residents by 2030
  - Vehicle Miles Traveled increased 200% from 1970 – 2000
- Congestion
  - Today: 17% of SHC > capacity
  - 2025: 65% of Interstate = LOS D or worse

# Not Same Old Same Old

- Systems Operations Matter
  - 60% of congestion from “incidents”
  - Major Interstate Incidents cost NC \$13M/year
  - Secondary accidents → 18% of freeway deaths
- Not just about “Projects”
  - Look at mobility needs & solutions
  - Mainstream “mobility” and “systems operations” in DOT
  - Analyze mobility at statewide, regional, corridor, and local levels

# Many Stakeholders Affect Mobility

- Internal
  - Transportation Planning Branch
  - Mobility & Safety Division
  - Division of Highways
  - Rail Division
  - Ferry Division
  - Public Transportation
  - ...
- External
  - MPOs & RPOs
  - Local Governments
  - Incident Responders (SHP, Fire, Rescue, etc.)
  - ...

# Mobility Workstream

## **Recommendations**

- Measuring Mobility
- Mobility Toolbox
- Systems Management
  - Planning
  - Operations

# Recommendations

## A. Measuring Mobility

1. Define Mobility Measures
  - a. For Highways (V/C, TTI & Reliability)
  - b. For Other Modes
2. Define Data Needs (Traffic Data WS)
3. Baseline then Set Targets
  - "Efficiently" Dashboard Gauge
  - Personal Dashboard & Appraisals (PDA's)



# Recommendations

## B. Mobility Toolbox

1. Create dynamic, all-encompassing, easily accessible warehouse of mobility solutions: includes what, when, how, and B/C for strategies that address recurring and non-recurring congestion.
2. Educate affected stakeholders

# Sample “Tools”

Tool	Examples
<b>Improve Service on Existing Roads</b>	
Traffic Incident Management	IMAP, Improving Incident Clearance Times
Traffic Signal Timing	Improving and Maintaining Signal Timing
Arterial Management	Coordinating Signals, Conversion to Superstreets, Upgrading Signal Systems
Access Management	Managing Access onto Highway System, Restricting Median Openings
Freeway Management & Traffic Operations	Traffic Management Centers, Speed Detection, Traffic Cameras, Message Boards, Ramp Metering, Speed Harmonization, Variable Speed Limits, Shoulder Use, Re-Striping
Road Weather Management	Weather Detection Systems, Bare Pavement Program
<b>Pricing</b>	
Value Pricing	High Occupancy Toll (HOT) or Express Lanes
<b>Add Capacity</b>	
Adding Capacity/Easing Bottlenecks	Widening, New Location, Upgrade Intersection to Interchange
Public Private Partnerships	New Toll Facilities

# Sample “Tools”

Tool	Examples
<b>Better Work Zones</b>	
Work Zone Management	Travel Time Information, Work Zone Coordination (programmatic)
<b>Travel Options</b>	
Travel Demand Management	Telecommute, Increasing Multimodal Travel Options, Alternate Work Schedules,
Planned Special Events Traffic Management	Improving Coordination between Parties, Travel Time Information
<b>Traveler Information</b>	
Traveler Information Services	511, Websites, Public-Private Partnerships
Travel Time Message Signs	Additional Message Signs, Real-Time Travel Time Msgs
National Traffic and Road Closure Information	Improving Coordination with Other States
Real-Time Travel Time Information	Real-Time Travel Information for Highways, Rail, Public Transportation, and Ferry
Freight Shipper Congestion Information	Real-Time Travel Information along Freight Significant Corridors

# Recommendations

## C. Systems Management Function

- Keeper of Mobility Metrics
  - M&S Division for “Safer”
  - SRMU for “Lasts Longer”
- Has input into needs assessment and project development at ALL STAGES: planning thru operations
- Assesses benefits of mobility solutions once implemented to inform Return on Investment (ROI) analysis

# Recommendations

## C1. Systems Management - Planning

- Statewide
  - Statewide Programs, Strategies, and Policies for congestion
  - Statewide Tier Corridor Studies
  - Prioritize Statewide Tier Mobility Projects
- Regional
  - Technical assistance for Regional Plans, esp. incorporating operational strategies
  - Technical assistance for Regional Tier Corridor Studies
- Manages North Carolina Multimodal Investment Network (NCMIN)

# Recommendations

## C2. Systems Management - Operations

- Arterial Management
  - Signals Management
  - Access Management
- Freeway Lane Management
- Incident Management
- Traveler Information
- Road Weather Management
- Emergency Management
- Work Zone Management
- Commercial Vehicle Operations
- Transportation Safety Security
- Safety and Crash Prevention
- Effects of Geometric Features on Traffic Operations



Aligned currently fragmented functions

# Recommendations

## C. Systems Management – Operations

### Better Define Roles and Expectations

- Statewide Transportation Operations Center
- 3 Regional Transportation Mgmt Centers
- 14 Divisions

# Recommendations

- Create Systems Management Group (SMG)
- Task SMG to implement recommendations of Mobility Workstream
  - Measure Mobility
  - Develop Mobility Toolbox
  - Implement Systems Management Functions



# Recommendation Details

- In “Transportation Strategy and Investment Analysis” to ensure highest probability of success
- 4-5 FTE’s needed (Reallocated positions)
- Synergies with Freight Coordinator
- Next Steps:
  - Scope out specific roles, responsibilities, and tasks with stakeholders
  - Develop job descriptions for reallocated positions
  - Showcase measures and benefits of mobility tools

# Questions?

## TMT Mobility Workstream

Meredith McDiarmid

Greg Fuller

David Wasserman

Kevin Lacy

Joe Geigle (FHWA)

Kelly Damron

Improving Mobility & Safety  
in  
North Carolina  
through  
Improved  
“System Operations &  
Management”

Kelly E. Damron, P.E. ~ November 2006

# Outline

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- Where are we today?
- Where do we need to be?
- Benefits and Advantages
- Resource Needs
- Next Steps

# System Operations & Management

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- Goal: Make the existing transportation system “work better” by using all of existing capacity. (Get folks from A to B!)

## Objectives:

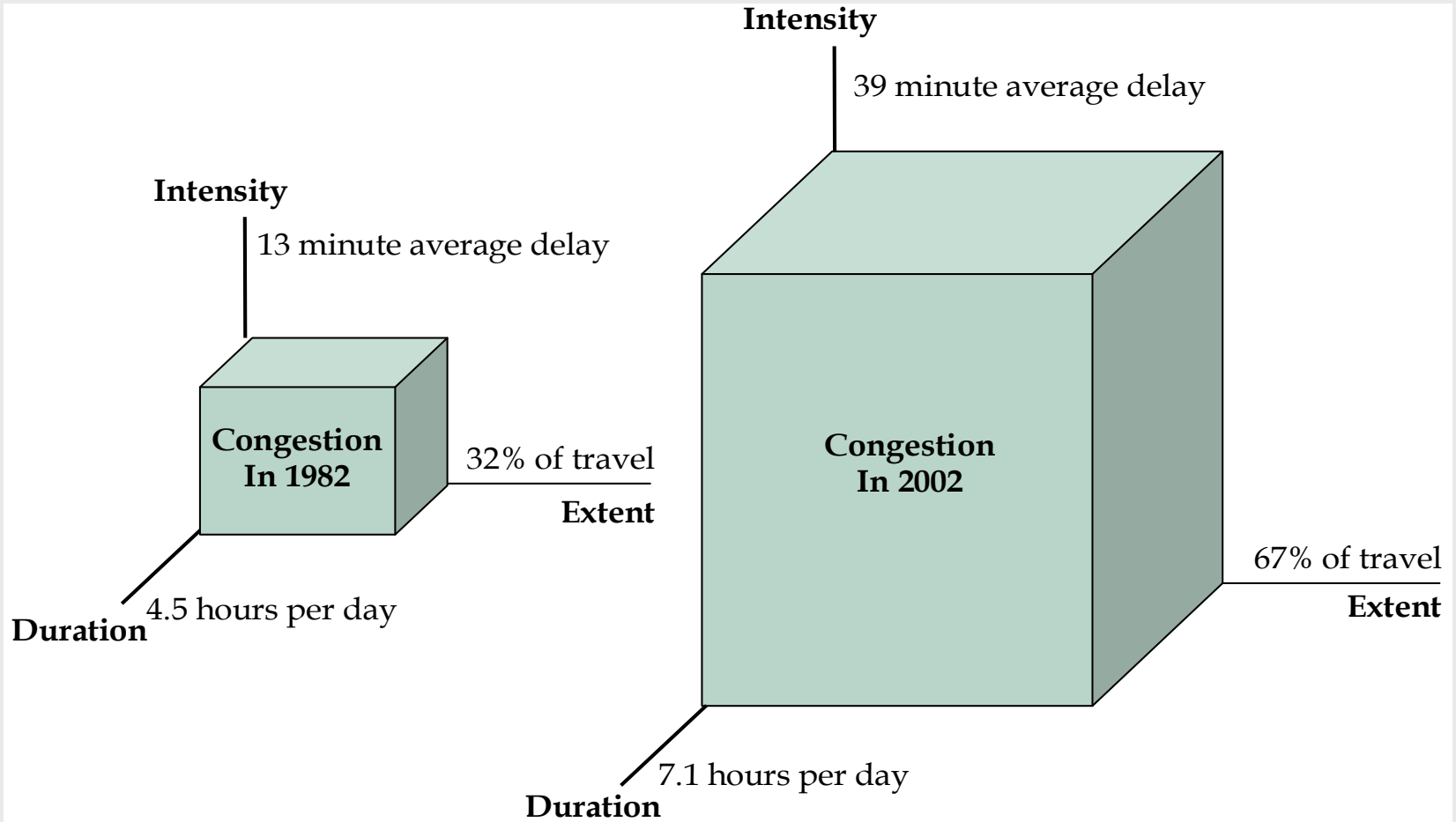
- Move traffic and commerce efficiently
- Enhance traveler safety & security
- Keep travelers informed

# North Carolina's Interstate

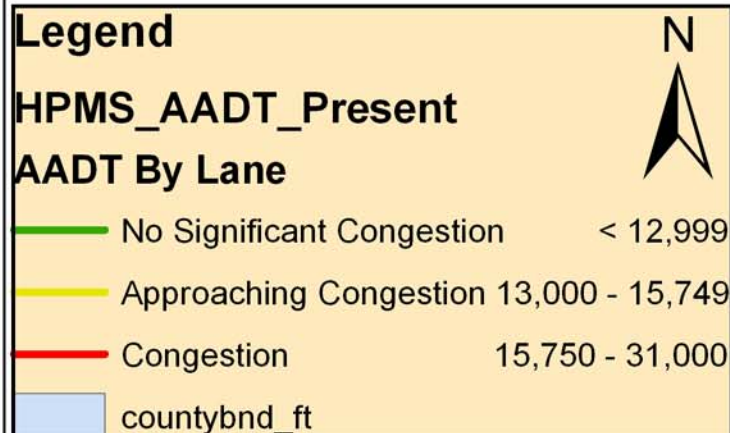
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- Provides mobility for commuters, businesses, tourists, hospitals, military bases, airports, schools, and hurricane evacuees.
- +/- 1200 miles
- 1.5% of system, moves 20% of traffic
- Complete blockages > 2 hours each week

# Congestion in the US



# Interstate Congestion in North Carolina (2004)

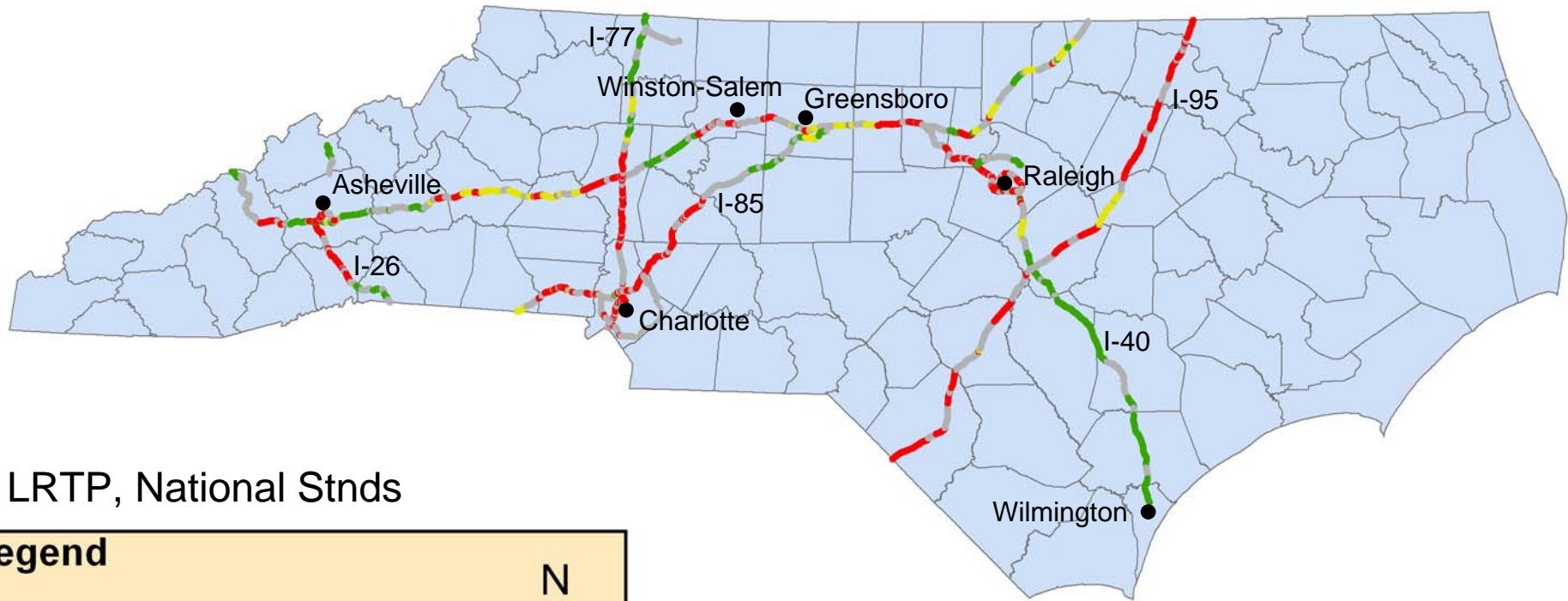


No Significant Congestion	75%
Approaching Congestion	9%
Congestion	16%





# Projected Interstate Congestion (2020-2025)



L RTP, National Stnds

## Legend

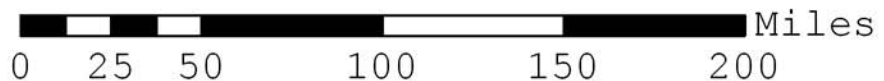
HPMS\_AADT\_Future

Future AADT By Lane

	No Data for these sections in the Sample	
	No Significant Congestion	< 12,999
	Approaching Congestion	13,000 - 15,749
	Congestion	15,750 - 31,000
	countybnd_ft	



	% in 2004	% in 2025
No Significant Congestion	75%	35%
Approaching Congestion	9%	17%
Congestion	16%	48%



# What Do These Colors Mean?

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## Yellow

Freedom to maneuver within the traffic stream is noticeably limited, and the driver experiences reduced physical and psychological comfort levels. Even minor incidents can create queuing, because the traffic stream has little space to absorb disruptions.

## Red

Traffic stream has no ability to dissipate even the most minor disruptions, and any incident can be expected to produce a serious breakdown with extensive queuing. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is extremely poor.

# Congestion Impacts on NC Travelers

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## Annual Hours of Delay Per Traveler\*

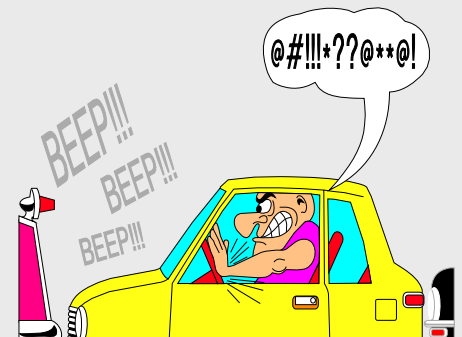
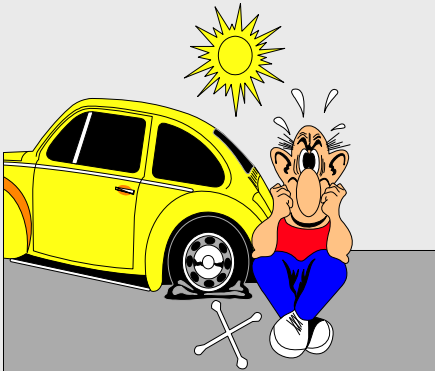
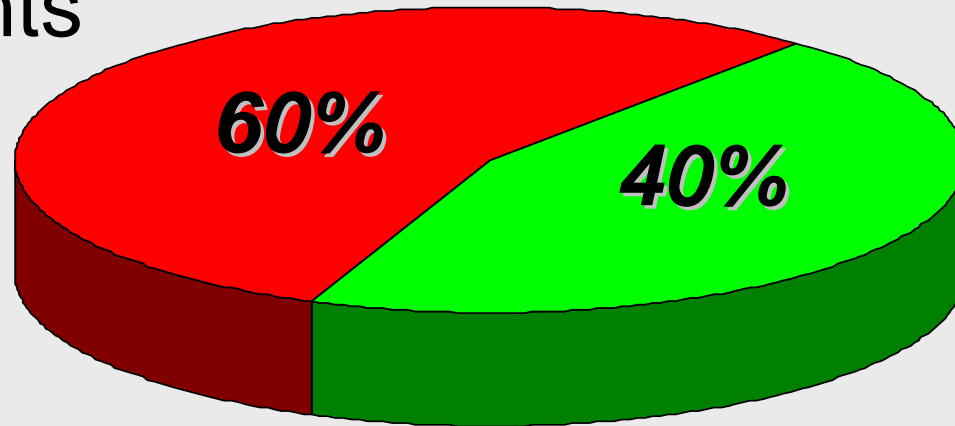
	1982	1992	2002
Charlotte	10	29	45
Raleigh-Durham	7	20	26

\* = TTI Urban Mobility Report (2002)

# Causes of Delay

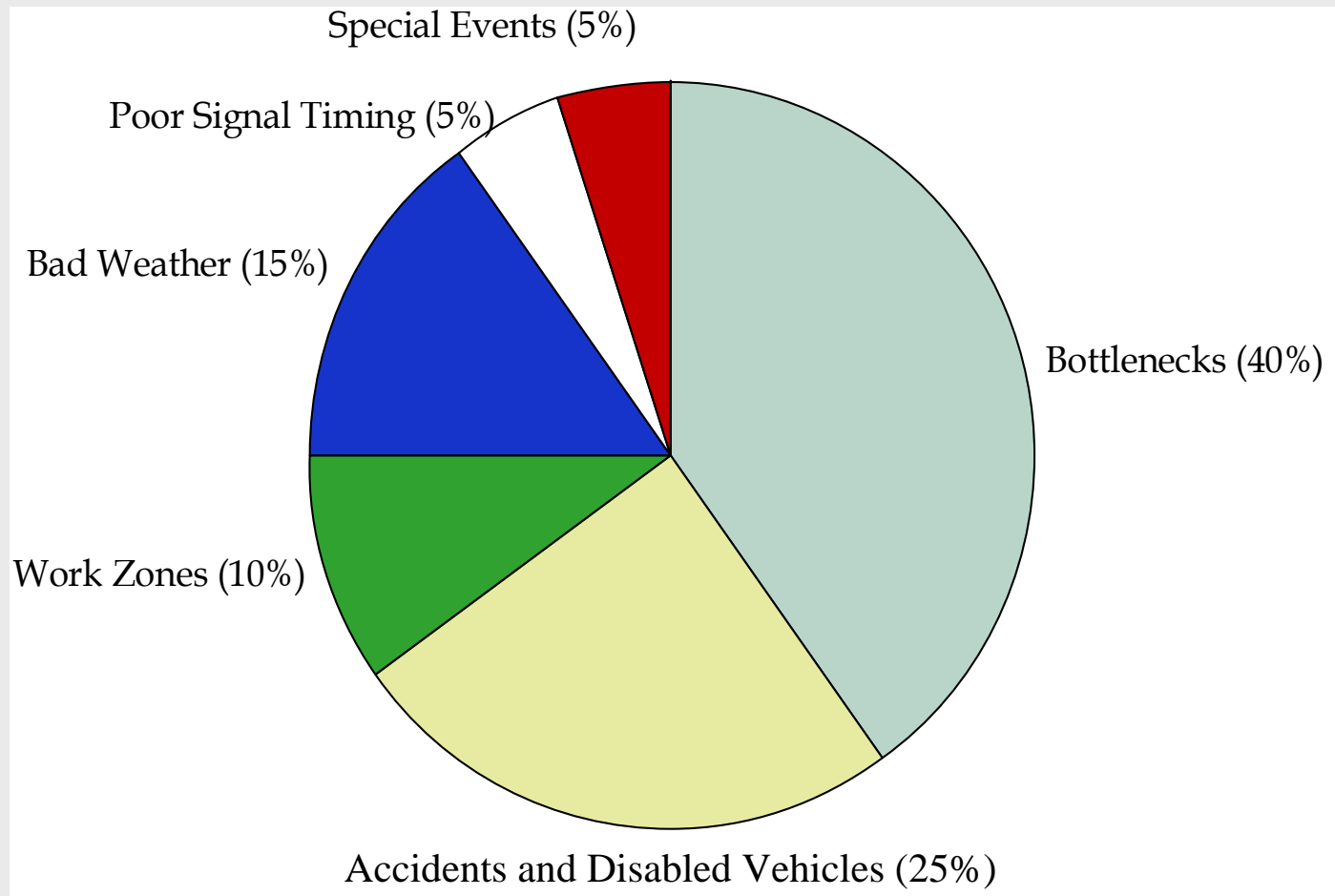
Incidents

Recurring



# Sources of Congestion

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# Impact of Incidents

- When a lane is blocked for **1 minute**, it takes **4 minutes** for traffic to recover.
- When **1 of 3** travel lanes is blocked, **50%** of the road's capacity is lost!



# How Much Do Incidents Cost?

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If one lane of a three-lane freeway is blocked for 20 minutes the delay caused to motorists will exceed 1,200 vehicle hours.

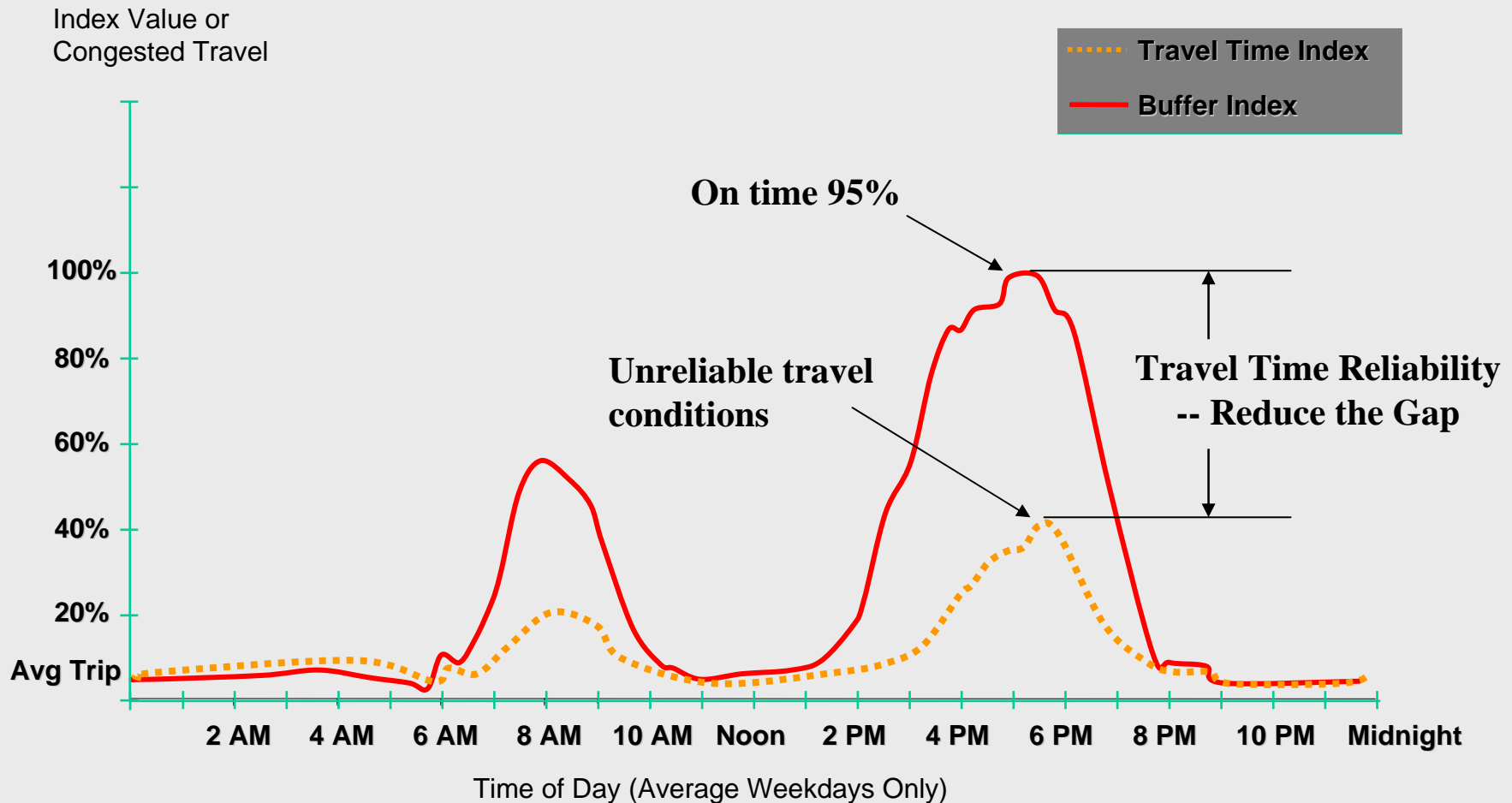
At the FHWA-assigned value of \$4.00 per hour for each vehicle hour of delay, the cost of the incident due to the delay alone is approximately

**\$5,000**



# Performance Measurement from the Customers Perspective - Reliability

## Travel Time Index and Buffer Index by Time-of-Day



Buffer Index = % extra time travelers allow for congestion to be on time 95% of time



# Safety Impacts of Incidents

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## Secondary Crashes

- National and NC data shows that secondary crashes account for nearly **30%** of all crashes.
- USDOT estimates that **18%** of the deaths on freeways are due to secondary crashes.

# Safety Impacts of Incidents

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	All Interstate Crashes	“Secondary” Crashes on Interstate
Total Crashes	42,661	~13,000
Fatal Crashes	335	More than 60*

\* = Derived (18% of freeway deaths due to 2ndary crashes)

## North Carolina 2003-2005 Crash Data

# Incidents

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- Don't overpromise - Not 0, just less disruptive
- Not entirely in our control
  - Police: notification (1%), response, goals
  - Fire, Rescue, Haz Mat, Towing: scene not network, goals

# I-40, Near Durham

## MM 282 - Just West of I-540

January 9, 2006 7:45 AM

### Incident Detail



#### Location

Durham County, Near Durham  
I-40 (Mile Marker 282 to 292) Heading West  
Lane Closed  
Expected backup is more than 2 miles

#### Start Time

1/9/2006 07:45 AM

#### End Time

1/9/2006 10:30 AM

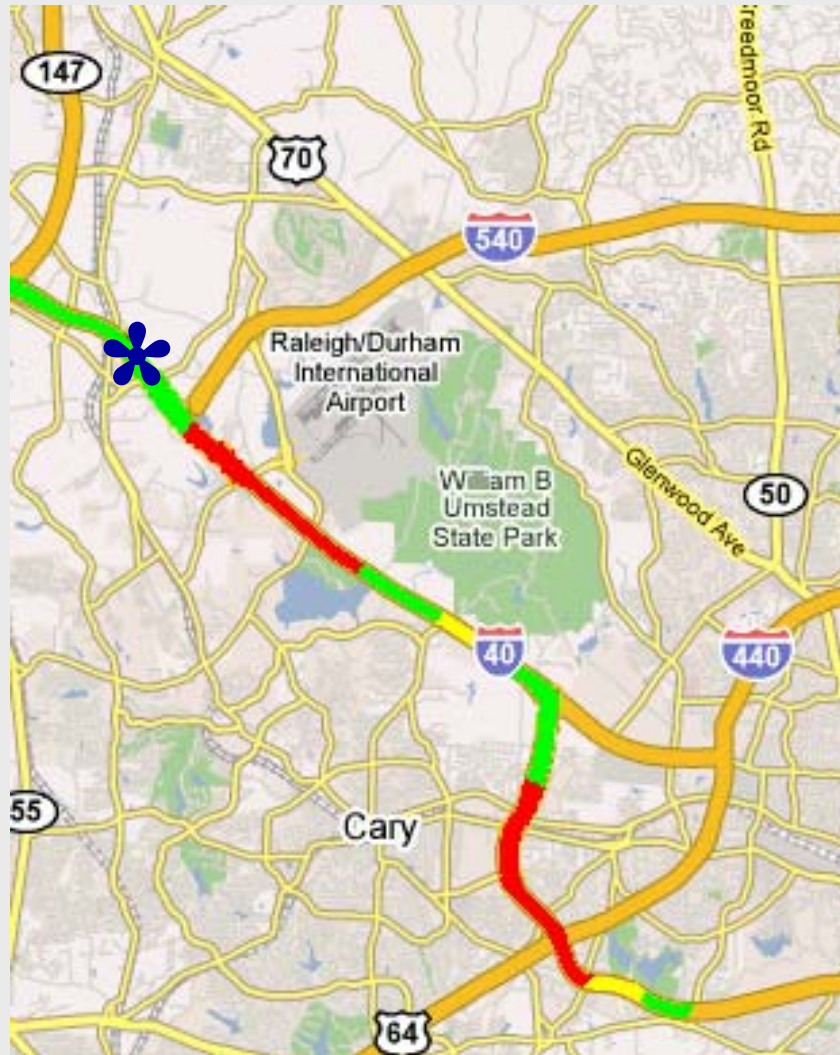
#### Reason

#### Vehicle Accident: Lane Closed

Accident vehicle in the westbound traffic of I-40, between Page and Miami blvd. ALL LANES NOW OPEN. EXPECT HEAVY CONGESTION MM 290 THRU 282.

- Injury accident
- Urban area
- 3 hour duration

# 8:02 AM - Road Closed For Injury Airlift



55+ mph

30+ mph

<30 mph

Time Elapsed:

17 minutes

Back-Ups:

4 miles

# 8:24 AM - 3 / 4 Lanes Blocked



55+ mph

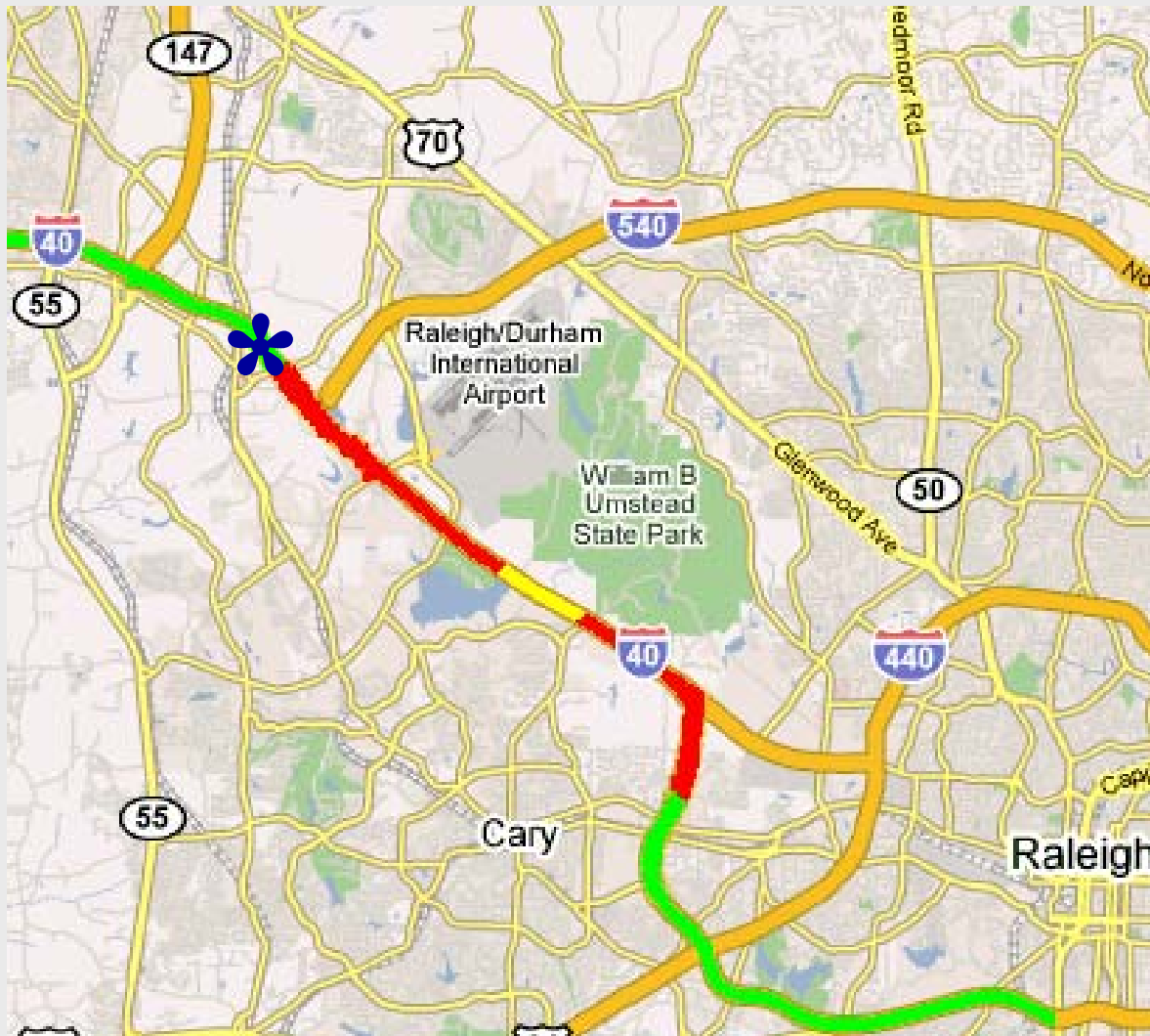
30+ mph

<30 mph

Time Elapsed:  
39 minutes

Back-Ups:  
6 miles

# 8:48 AM - TIMS Special Alert



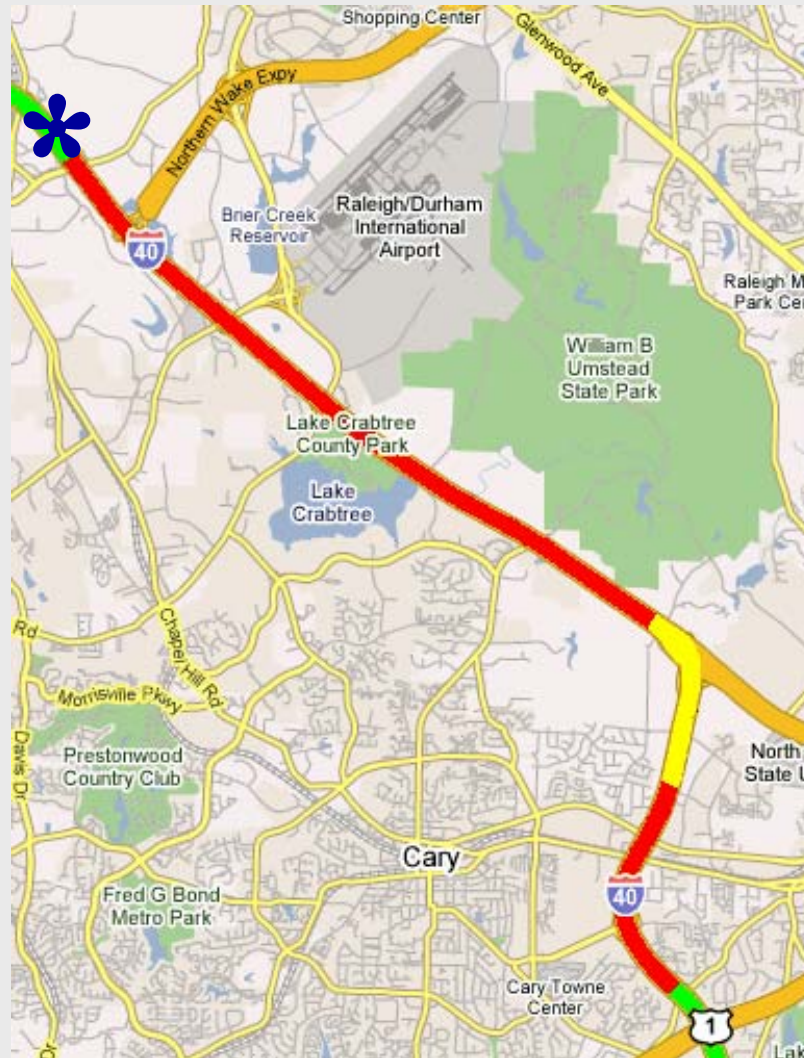
- 55+ mph
- 30+ mph
- <30 mph

Time Elapsed:  
1 hour, 3 minutes

Back-Ups:  
8 miles



# 9:09 AM



55+ mph

30+ mph

<30 mph

Time Elapsed:

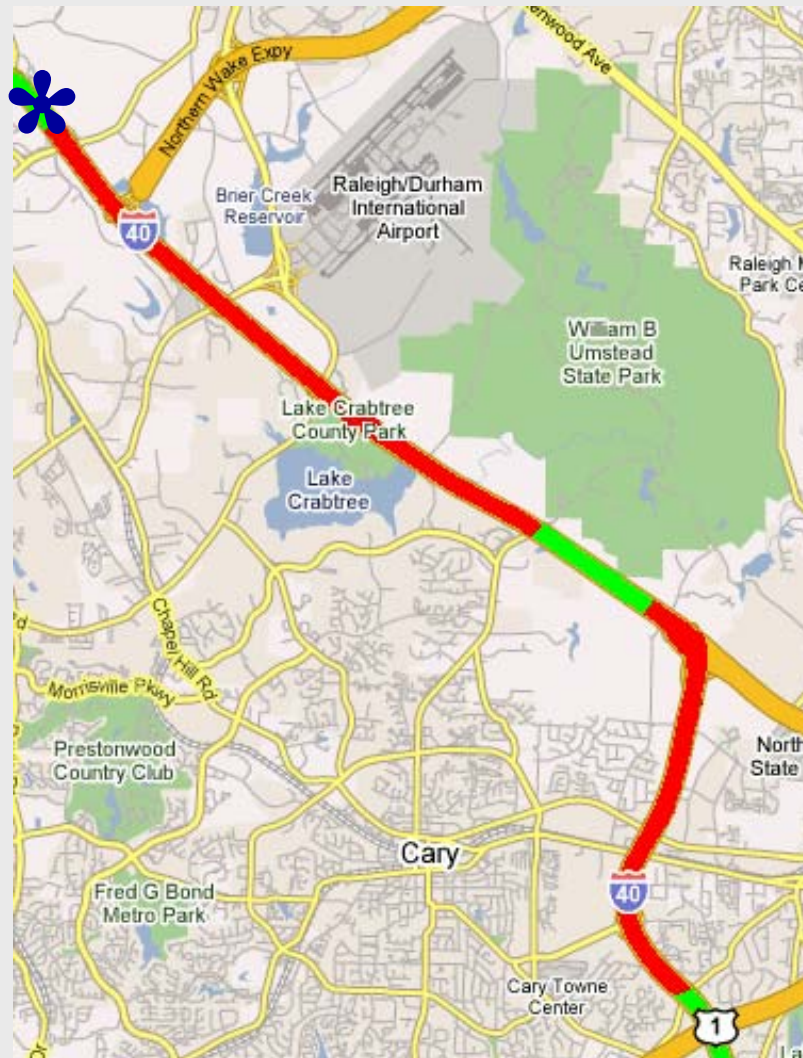
1 hr, 24minutes

Back-Ups:

9 miles



# 9:37 AM - All Lanes Open



55+ mph

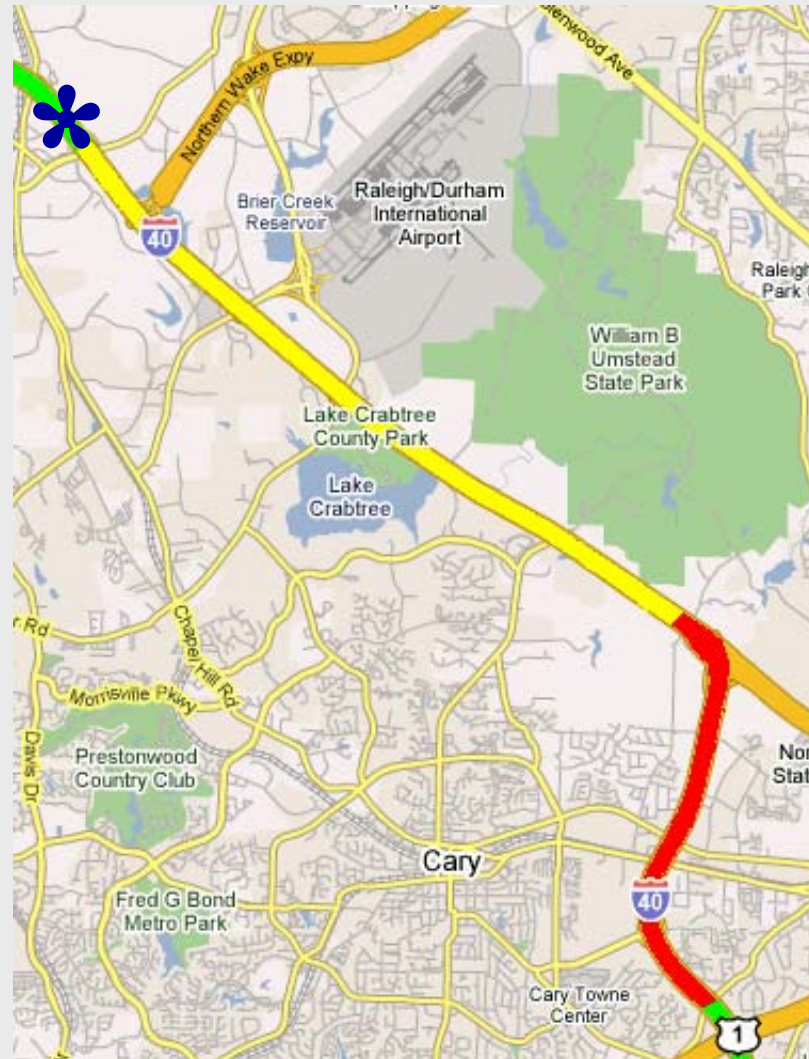
30+ mph

<30 mph

Time Elapsed:  
1 hr, 52 minutes

Back-Ups:  
9 miles

# 10:17 AM - Residual Delays



55+ mph

30+ mph

<30 mph

Time Elapsed:

2 hours, 32 minutes

(45 mins since cleared)

Back-Ups:

9 miles



# I-95 Near Kenly

## Incident Detail

### Location



Johnston County, Near Kenly  
I-95 (Mile Marker 107 to 105) Heading South  
Road Closed with Detour  
Expected backup is more than 2 miles

### Start Time

9/22/2005 07:00 AM

### End Time

9/22/2005 04:00 PM

### Reason

**Vehicle Accident: Road Closed with Detour**

A tractor trailer accident has closed southbound to I-95 at 105. The accident is a fuel and debris closure.

## Incident Detail

### Location



Johnston County, Near Kenly  
I-95 (Mile Marker 105 to 106) Heading North  
Road Closed with Detour  
Expected backup is more than 2 miles

### Start Time

9/22/2005 12:00 PM

### End Time

9/22/2005 03:44 PM

### Reason

**Vehicle Accident: Road Closed with Detour**

All Northbound lanes will be shut down to allow crane to remove tractor trailer from railing on Southbound side of I-95.

### DETOUR

All I-95 Northbound traffic take exit 105 and turn right onto Bagley Road (SR 2339). Follow Bagley Road for 1 mile and then turn right onto Richardson-Bass Road (SR 2414). Follow Richardson-Bass Road for 1 mile and turn left onto Princeton-Kenly Road (SR 2342). Follow Princeton-Kenly Road for 1.5 miles back to I-95 Northbound at milemarker 106.



- Truck hits mower
- Rural Area
- 9 hour duration
- NB & SB I-95 affected



# I-95 Near Selma

## Incident Detail

### Location



Johnston County, In Selma  
I-95 (Mile Marker 97 to 95) Heading North  
Road Closed  
Expected backup is more than 2 miles

### Start Time

1/10/2005 10:30 AM

### End Time

1/11/2005 11:10 AM

### Reason

#### Vehicle Accident: Road Closed

Earlier Tractor Trailer accident and fire closed I-95 under the US 70 overpass at exit 97. Road is closed to repair damage.

### DETOUR

All traffic must exit I-95 northbound at Exit 97 (US 70 A) off ramp and re-enter I-95 via the Exit 97 on ramp.



- Rural Area
- Lasts > 24 hours

# I-40/I-85 Near Graham



## Location

Alamance County  
I-40 (Mile Marker 145) Heading East  
Road Closed, In Graham  
Expected backup is more than 2 miles

## Start Time

5/31/2006 07:19 AM

## End Time

5/31/2006 10:30 AM

## Reason

### Vehicle Accident: Road Closed

Road Closed due to multiple vehicle accidents.



<http://www.wral.com/video/9299233/detail.html?taf=rail>



- 90 vehicle accident
- Suburban area
- 3 hour duration



# Incidents



Reed Saxon / AP file

As traffic grows and capacity increasing projects slow incidents are more likely and will have a more significant impact on already congested traffic flow, further degrading Safety & Mobility, and decreasing

**RELIABILITY**

# “System Operations & Management” in NC



- 3 Transportation Mgmt Centers
- 150 Dynamic Message Signs
- 200 Traffic Cameras
- TIMS Website & 511
- 500 Miles of IMAP
- 139 CL Traffic Signal Systems



# What Do We Have Today?

## Fragmented Parts & Pieces

---

Used for

- Day to Day “Incidents”
  - Major Accidents
  - Work Zones
  - Weather Events
- Hurricanes & Snow Storms
  - Hurricane Floyd - Sept 1999
  - Hurricane Ivan in Mountains - Sept 2004
  - Hurricane Ernesto - Aug/Sept 2006



# Constraints

---

- “System Operations” not institutionally important
  - Limited number of dedicated staff
  - Slow uptake with c&m staff
  - Traffic is 24x7x365, DOT is not
- ITS Devices
  - Acquired through c&a TIP projects
  - Ok output, limited input

# But It Is Effective???

---

- **OUTPUTS**

- 1.4 M Calls to 511 in 26 months of service
- 250 closed roads entered on TIMS during Ernesto

- **OUTCOMES**

- Have no current way of measuring “Mobility” or “System Reliability” in NC
- Many measures exist - Lane Hours of Delay, Travel Time Index
- Need “sensors” to collect data to assess and measure these things!

# “System Operations & Management”

- Freeway Management
- Arterial Management
- Traveler Information\*
- Incident Management\*
- Emergency Management
- Work Zone Management



- Ramp Metering
- Commercial Vehicle Operations
- Transit Management
- Road Weather Management
- Electronic Payment Systems (Tolls)
- Crash Prevention & Safety

# Incident Management



- Washington State DOT and State Police
- Joint Operations Policy Statement
- 90 Minute Clearance Goal

# Work Zone Management

New Mexico used ITS to reduce traffic incident clearance time from 45 minutes in the past to 25 minutes during the project.

## Coordination with Emergency Services



## ITS Control Center



# San Antonio, Texas

Especially useful  
when 2 alternate route  
travel times are provided in  
advance of decision point...

## Signs for IH 35 Northbound

Cross Street	Milepost	Current Sign
Southcross (Over Freeway)	152.203	TRAVEL TIME TO US90 UNDER 5 MINS US281 6-8 MINS
Powell (Over Freeway)	154.267	TRAVEL TIME TO US 281 4-6 MINS
Alamo (Lower Level Freeway)	154.933	TRAVEL TIME TO US 281 UNDER 5 MINS
Guadalupe (Upper Level Freeway)	155.190	TRAVEL TIME TO US 281 UNDER 5 MINS
Flores (Lower Level Freeway)	156.536	TRAVEL TIME TO LP 410 SOUTH 7-9 MINS
Main (Upper Level Freeway)	156.771	CONSTRUCTION ON RIGHT SHOULDER US 281 NORTH
McCullough (Lower Level Freeway)	157.021	CONSTRUCTION ON RIGHT SHOULDER US 281 NORTH
New Braunfels (Over Freeway)	158.989	TRAVEL TIME TO LP410S 4-6 MINS WALZEM 7-9 MINS
Salado Creek (Over Freeway)	160.883	TRAVEL TIME TO WALZEM 5-7 MINS LP1604 11-13 MINS
Eisenhower (Over Freeway)	165.090	TRAVEL TIME TO 410/281 7-9 MINS LP1604 7-9 MINS



# Ramp Metering Minnesota

## Turned off Ramp Metering for 6 weeks (2000)

- Crashes increased by 24%
- Travel Time Reliability decreased by 50%
- Freeway throughput decreased by 9%
- 80% of public wanted meters turned back on



# Improved System Operations & Mgmt Benefit /Cost Estimates

---

- Tuscon, AZ: \$6.3 benefit /\$1 invested
- Cincinnati, OH: \$11.80 benefit / \$1 invested
- Seattle, WA: \$12.20 benefit / \$1 invested



# Similar To Other Services in the 21st Century

---

- UPS - real time package tracking
- SW Airlines - real time flight tracking
- McDonald's - 44 second average service time
- Duke Power - real time estimates of service restorations

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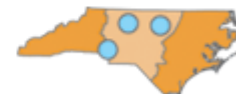
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Click the map for regional information or



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**Special Alert****MOST FERRY SERVICE SUSPENDED DUE TO WEATHER CONDITIONS**

Most ferry service along North Carolina's coast is currently suspended due to weather conditions, with the following exceptions:  
The Currituck-Knotts Island route will cease operations following a final run from Currituck to Knotts Island at 3:45 p.m.;  
and

The Southport-Fort Fisher route is currently running on schedule.  
Due to the storm, ferry service is not expected to resume until Thanksgiving. For updated information, please call 1-800-BY-FERRY or visit [www.ncferry.org](http://www.ncferry.org).

**The N.C. Department of Transportation will suspend MOST road construction activities that could affect travel over the Thanksgiving holiday.**

Major construction projects along Interstate and U.S. routes across the state will be suspended beginning at 4 p.m. on Tuesday, Nov. 21, through 9 a.m., Monday, Nov. 27. However, motorists can expect lane closures on two N.C. routes in Pender County on Wednesday, Nov. 22. N.C. 133 will be reduced to one lane from N.C. 210 to U.S. 117, and N.C. 210 will be reduced to one lane from U.S. 421 to the Bladen County line. Motorists can expect flagging for paving operations along these routes.

NCDOT reminds motorists that even though workers may not be present in the majority of work zones, motorists can still encounter narrowed lanes and traffic shifts. The penalty for speeding through a marked work zone is \$250.

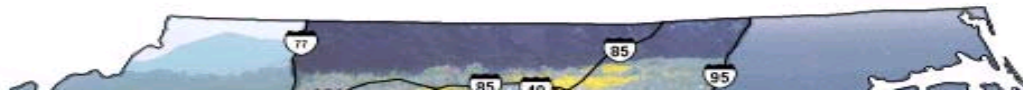
Additionally, the department offers the following driving tips during the holiday:

- \* Stay alert;
- \* Be patient and obey the posted speed limit;
- \* Leave early to get a head start on your drive and travel at non-peak times;
- \* Use alternate routes, when possible, to avoid traffic congestion; and
- \* Call 511, the department's free travel information line for real-time travel information.

Motorists should also remember to move over when passing stopped emergency vehicles or if involved in a minor accident. Under the Move Over law, motorists are required to change lanes or slow down when passing stopped law enforcement, emergency vehicles, wreckers and NCDOT's Incident Management Assistance Patrol Vehicles with flashing lights. Similarly, the Fender Bender law requires motorists to clear the roadway of non-injury accidents to help keep traffic moving and reduce the likelihood of secondary crashes.

**Traveler Information Management System****Welcome to NCDOT's  
Traveler Information Management System. (TIMS)**

Get real time information on events that cause severe and unusual congestion on [NCDOT](#) maintained roadways in North Carolina by clicking a region on the map, by choosing a county, or by choosing a road below.

Select by Region: Route: County: 



### Thanksgiving Weekend Travel

- [Best Times To Travel Snoqualmie Pass](#)
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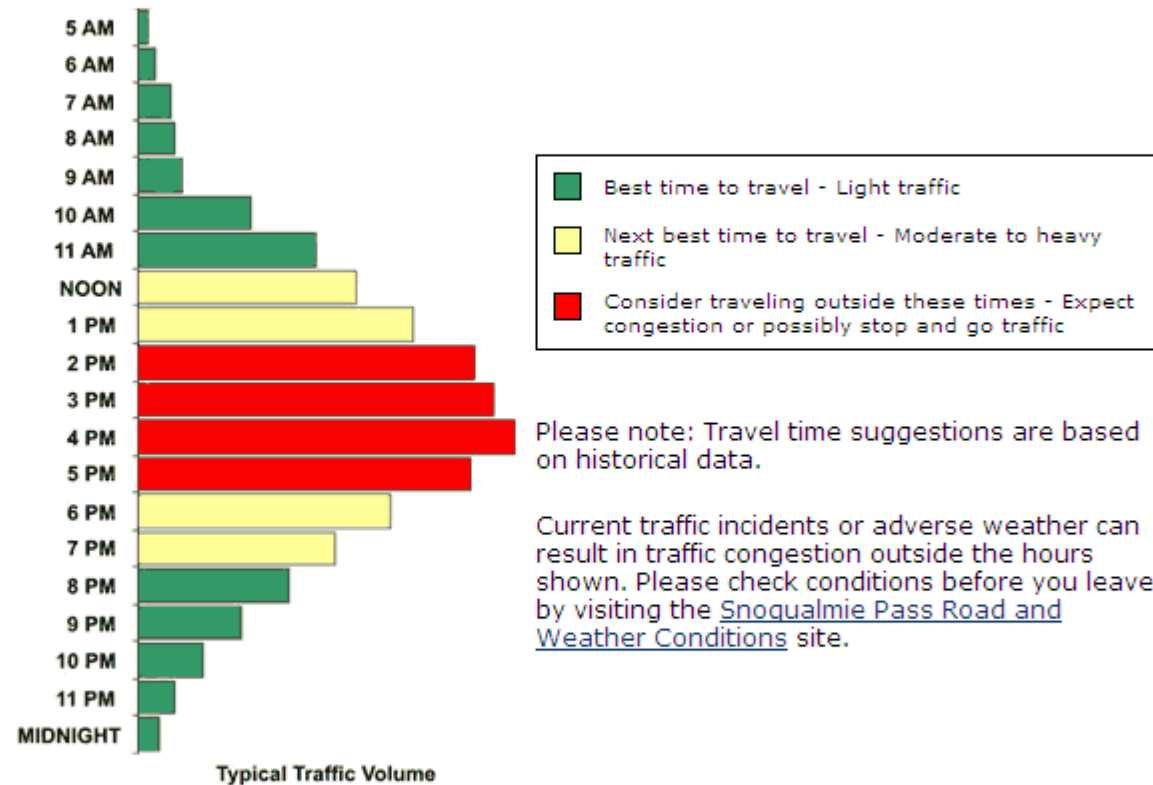
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- [I-5 - Everett, SR 526 to US 2 HOV Lanes](#)
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### Typical Traffic Volume

#### Cle Elum to North Bend (Westbound I-90)



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Wednesday, November 22, 2006

#### 511 in high water

It was pouring rain across most of the state this morning, and there was some street flooding. A lot of us plan to do some holiday driving today. What did we learn by dialing 511 -- the robot voice of DOT -- at 9:30 a.m.?

- First: The ferries are not running because of the lousy weather.
- Second: Most road construction work was suspended for the holidays Tuesday, but there will be construction backups today (Wednesday) on two highways in coastal Pender County.

*Really? I doubt they're going ahead with that work in this rain. This prominent message might need to be updated.*

Now, what can we learn about Triangle weather today?

- "Current conditions" at 9 a.m.: 43 degrees, 15mph wind from the north. Forecast today cloudy with 60 percent chance of rain.

*Is this a joke? Look out the window to check the most important current conditions: It has been raining buckets since yesterday. There are wind and flood warnings in effect, and the National Weather Service puts the chance of rain today at 100 percent.*

#### About This Blog

##### CROSSTOWN TRAFFIC



Bruce Sicheloff

Crosstown Traffic is all about getting around in the Triangle. Bad drivers and traffic hassles. Gas taxes and transportation politics. Public transit and other auto alternatives.

The blog is maintained by N&O transportation reporter **Bruce Sicheloff**, whose **Road Worrier** column is published each Tuesday.

This traffic is two-way. What do you think? Leave a comment or email Bruce with questions, links, tips or gripes.

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Start operations ... Microsoft P... Damron Kell... 511 - Inbox... Desktop presentations newsobse...

10:44 PM



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[more...]

OK, what can we learn about highways in the Triangle area? - "There are 137 high-priority incidents in the Triangle metro area." Would you like to hear all of them?

*Of course not. Give me the true priorities -- the accidents or other problems that have cropped up this morning.  
Oh well, I'll listen to a few of these 'high priorities'.*

The list includes four I-440 Beltline items -- two apiece about the sections from mileposts zero to 11 and from mileposts 11 to 17. One says it's windy. The other says it's rainy. The list includes quite a few about US 1 between Lee County and Youngsville. One says there are strong winds, the next says there is flooding. Then one says there is heavy rain along US 1 "expected to begin at 8:57 a.m. and last about an hour." Other items, all about US 1, report that there is rain and there is a flooding advisory. Somewhere in there we learn of an accident this morning on southbound US 1, which has closed a traffic lane near the Cary Parkway. That news about the accident is what I call high priority information. Sometimes you can find it on our 511 phone service and its hard-to-find [online counterpart](#) (suggestion: Give it a short URL, something like 511.ncdot.org) -- but you shouldn't have to die for it. Just one of us, you'll find that the commonwealth of Virginia has a [better approach](#). DOT is trying to improve our 511 service. It takes money to provide enough staffing on busy, blustery travel days such as today. It takes smart staffing to make sure the important info is up-to-date and is presented clearly and prominently. And it takes a whole network of DOT construction and maintenance engineers, law enforcement agencies and other emergency workers to provide the timely, helpful information travelers need.

Posted at 10:55 am by Bruce Siceoff in [Traffic, Safety, NCDOT](#)  
Leave a comment

### Archives

#### November 2006

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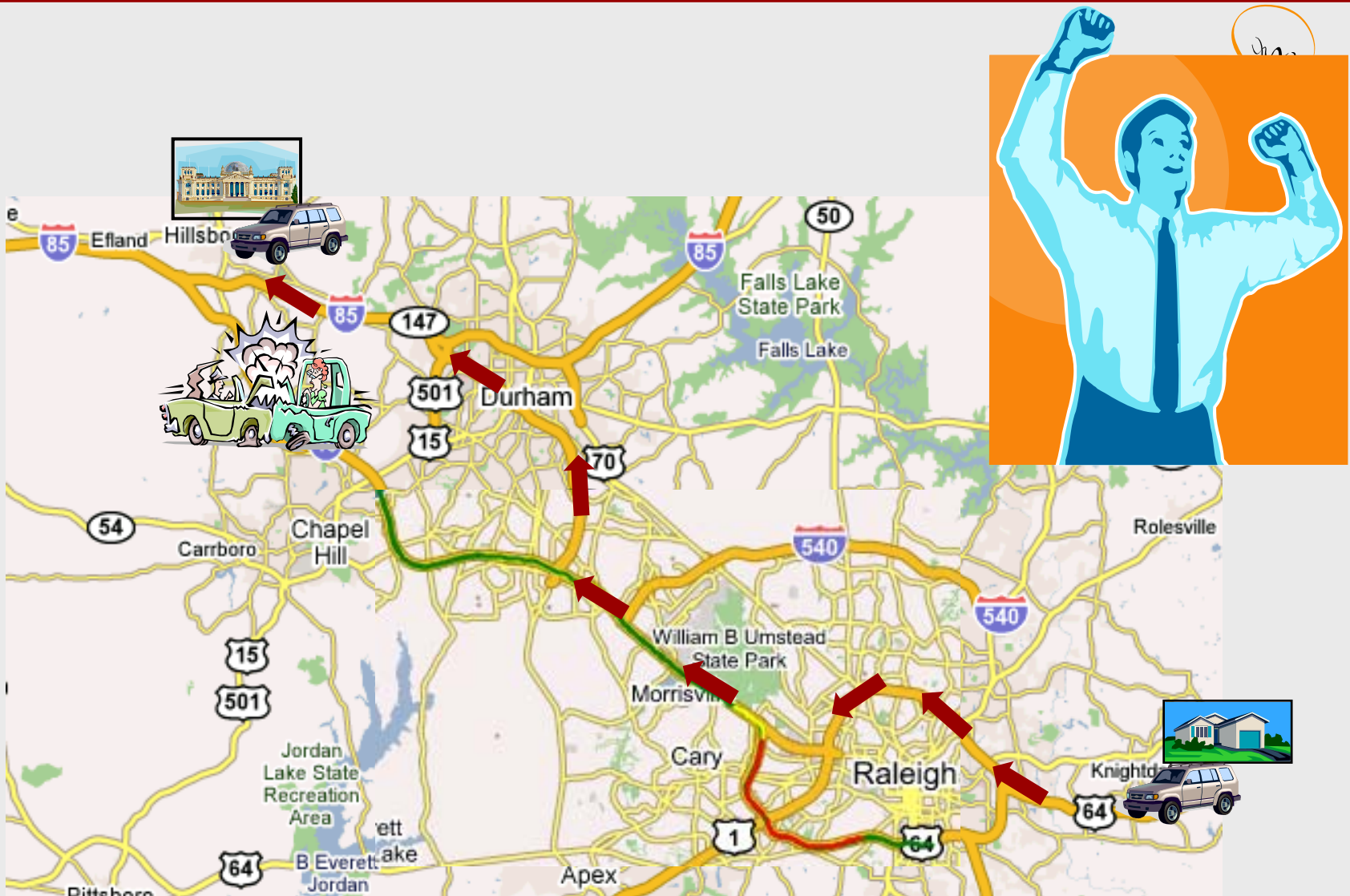
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Start operation... Microsoft... Damron... 511 - Inb... Desktop presenta... newsob... Internet

10:48 PM

# Improved SO&M In NC





# What Would This Take?

- Ability to monitor conditions
- Ability to respond more efficiently
- Shared goal for all responders



# Resource Needs

---

- Staff – Institutional focus and appropriate staff dedicated to SO&M
- \$\$\$ - Dedicated funds for capital and O&M
- Inter-agency Cooperation – especially NCSHP

# Sensors

- In Pavement
- Out of Pavement
- Fleet as Probes
- Traffic.com
- UAV!



# 24 x 7 x 365 Hub

## Multi-agency, Multi-modal Statewide Transportation Operations Center

- SBI?
- NWS?
- DOT Security?



# Opportunities for PPP?

---

- Communications & Outputs
- Cost sharing possibilities
  - Own
  - Lease
  - Share
- Possible Partners
  - Media
  - Universities
  - Telecomm Industry
  - Non-Traditional Uses (Industry Brainstorm!?!?!)

# Synergies

---

- Homeland Security - including VIPER & TSA
- Weigh Station / Transponder Project
- Work Zone Improvement Policy - esp. Nighttime Support
- Traffic Data Collection For
  - Performance Measures
  - Work Zone Planning
- Multi-modal Operations: Hwy, Rail, Ferry, Transit
- SAFETEA-LU - Real Time Travel Info Requirements



# In Summary

---

- Safety and Mobility needs exist and continue to grow on the Interstate
- Minimal capital improvements to address this need
- “System Operations & Management” improvements on the Interstate can maximize use of existing capacity to increase system reliability

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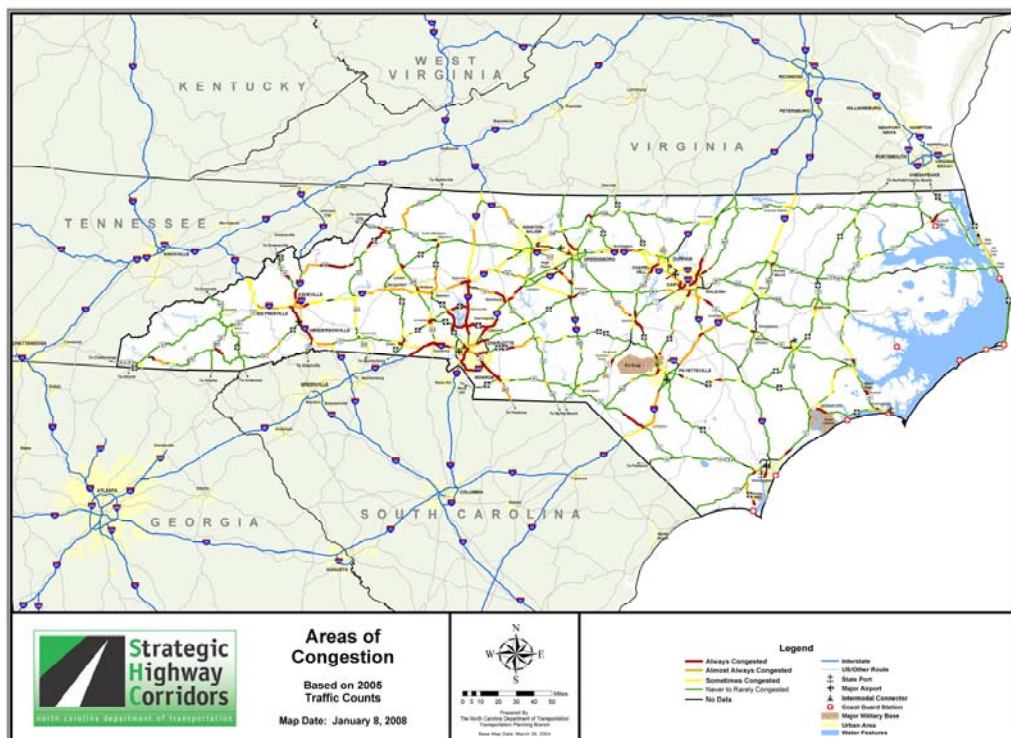
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## I. Mobility Matters to North Carolina

Mobility is the ability to move unimpeded, safely, and efficiently using a reliable transportation system and it has never been more important to North Carolina residents and businesses. North Carolina is in a period of expansive growth, both economically and in population, and few things have as much impact on the quality of life of our citizens as mobility. It has direct statewide impacts on traveler safety and security, personal health, business productivity and economic vitality, as well as air and water quality. With the state's current rate of growth, the challenge of maintaining an acceptable level of service for mobility becomes increasingly difficult.

Between 1970 and 2000 vehicle miles traveled (VMT) in North Carolina increased approximately 200%, while during the same period, the state's population grew approximately 50% to 8.1 million people. This population expansion is expected to continue in the future resulting in an additional 3.6 million new residents by the year 2030 and a VMT increase of 190% from 2000. Currently 17% of North Carolina's most important and highest use facilities, the Strategic Highway Corridors, are operating at or over capacity (see figure below). By 2025, if no changes are made to the current approach, over 65% of our 1200-mile Interstate system will operate at an unacceptable level of service. With the anticipated increases in population and VMT, congestion will continue to worsen if changes are not made to how the Department plans and operates the transportation system.



In addition to a lack of physical capacity, other factors that affect mobility include vehicle crashes, work zones, and weather events; these “incidents” account for about 60% of all mobility delays. When you consider that it takes a highway four minutes to recover from a one-minute blockage and blocking one of three lanes results in a 50% reduction in capacity, it is clear that delays can quickly reach unacceptable levels. A 20-minute lane blockage on a 3-lane freeway can result in 1200 vehicles delayed one hour. The value of this delay is approximately \$42,000.<sup>1</sup> Every week a vehicle crash in North Carolina completely blocks the Interstate for two or more hours, stopping or delaying vehicle and freight mobility. These incidents alone result in \$13M of delay each year on North Carolina Interstates.

Delay is not the only consequence of congestion and lack of mobility. National and NC data shows that secondary crashes (crashes that occur due to excessive queuing from previous incidents) account for nearly 30% of all crashes. Using a USDOT estimate that 18% of the deaths on freeways are due to secondary crashes these secondary accidents result in 60 fatalities in our state each year. In addition to the cost and safety impacts of congestion, the lack of “reliability” in travel time caused by incidents directly affects our citizens. Emissions from vehicles idling in traffic negatively affect air and water quality in our state. Mobility has a far-reaching affect on the Quality of Life in North Carolina.

To improve mobility NCDOT must look to new approaches. The solution lies in taking a performance results-based approach to improve mobility on the most important corridors in our state. By approaching this problem strategically, we will begin to mitigate the current and expected congestion to “make our transportation network move people and goods more efficiently<sup>2</sup>”.

---

<sup>1</sup> Recent NCSU and UNC research determined the average value of time for personal travel to be approximately \$15/hour and \$145/hour for commercial travel.

<sup>2</sup> NCDOT Goal Statement, 2007

## II. Scope of “Mobility”

In scoping our efforts for this task we considered mobility in both a narrow and a broad sense. In the narrow view mobility is about mitigating traffic congestion. “Highway systems operations” type improvements such as reducing incident clearance times, ramp metering, optimizing signal performance, upholding access management policies, etc. fall in this category. In a broader sense, mobility is about “access” – about providing connectivity to our citizens. This piece of the mobility puzzle is where non-highway modes such as transit, rail, ferry, and bike and pedestrian facilities can contribute to mobility more significantly than our current planning process allows, even moreso when we consider combinations of highway and other types of improvements in trying to address specific mobility needs.

In both areas, the greatest need is to “mainstream” mobility into the work that DOT does everyday – from the planning phase through design and operations. Our recommendation in Section III lay out the steps necessary to accomplish this.

These two concepts align with the TMT’s proposed draft objectives towards our goal of “moving people and goods more efficiently”

1. *Implement innovative transportation solutions and optimize operational efficiencies to reduce congestion and improve travel time reliability.*
2. *Expand and improve all modes of transportation and increase connectivity across and within all modes to enhance continuity in our transportation network.*

To effectively implement the specific recommendations found in Section III we recommend the following initial steps after TMT Leadership Team approval:

1. Assign Meredith McDiarmid of the Work Zone Traffic Control Unit to “shepherd” the recommendations along and ensure completion. Much like Virginia Mabry is doing for the TIP recommendations.
2. Share this document with then convene a large *summit* of affected multi-modal NCDOT mobility stakeholders to discuss the overall approach and further refine recommendations as necessary.

### III. Recommendations

5-14-08  
Submission to Leadership Team

#### MOBILITY RECOMMENDATIONS IMPLEMENTATION PLAN

To meet the NCDOT goal of "moving goods and people more efficiently" we must first define a measure and a target for this "Mobility" goal. (These targets will differ by tier to reflect the purpose of each tier of our transportation network.) From there we must design and implement a process that will enable the Department to prioritize mobility needs and implement solutions that help us meet our targets. This information must then be communicated to internal and external stakeholders as a way of creating realistic "Level of Service" expectations.

Quantifying our "mobility" goal will allow us to roll it up with existing "safety" and "lasts longer" indicators to complete the tri-fecta and allow NCDOT to calculate overall measures of system performance. The outputs of this process are key to enabling our new Strategic Planning function to improve decision-making and ultimately improve the overall performance of our transportation network.

The recommendations listed below are the necessary steps to accomplish these outcomes.

Item	Recommendations	Rationale	Next Steps	Stakeholders	Implementation Team
<b>A. Measure Mobility</b>					
1a	Define mobility measures for highways	Some mobility measures (TTI & Reliability) were proposed In the TMT Mobility workstream presentation in the Fall of 2007. Need to ensure these are the optimum measures and get buy-in on it from affected stakeholders. We recognize that measures may differ between tiers (i.e. LOS, V/C, TTI, etc.) and there may be different indicators for near and long-term perspectives.	<ol style="list-style-type: none"> <li>1. Ask Kevin Lacy to create 2-page whitepaper on state of practice in measuring highway mobility in the US. Use AASHTO, FHWA, University Transportation Centers (UTC's) and TRB sources. Acknowledge benefits of being consistent with national practices. Work with Moy Biswas to get ITRE to do same in an under 80-hour research contract. Compare and contrast results.</li> <li>2. Convene meeting of all affected stakeholders to discuss findings and agree to standard highway mobility measures by tier.</li> </ol>	Pre-Construction, Traffic Engineering, Divisions, Planning, Asset Mgmt, Work Zone Traffic Control Unit, Research, ...	
1b	Define mobility measures for other modes	Some mobility measures exist for non-highway modes (see metrics for Piedmont and Carolinian RR services). Need to have mobility quantification in all modes to define needs, compare benefits (i.e. Return on Investment (ROI)) and evaluate effectiveness of various "projects" once implemented. Mobility in this context will likely include increasing connectivity as well as reducing congestion.	Meet with all modal administrators to begin same effort as defined here for highways.	Ferry, Rail, Public Transportation, Aviation, Bike & Ped, ...	
2a	Define data needs to	Need to identify data needed for mobility analysis, and then	1. Define data needs and collection	Traffic Engineering,	TMT Traffic Data

	measure mobility for highway tiers	define best ways to obtain it. Consider corridors versus points, arterials versus freeways, manual versus automated data collection, size and frequency of sampling, peak versus non-peak periods, and different levels of data needs for capital versus operational improvements. Should this data be collected locally or centrally, what are mechanisms for QA/QC, achieving, sharing and output to Dashboard? Also, acknowledge this data is needed for other functions within the Department, including Traveler Information, and reach out to these other users to create synergies.	methods to adequately measure mobility by tier. May include recommendations on needed data collection or analysis tools. 2. Work with TMT Traffic Data Workstream to insure that needed data is readily available to all affected stakeholders. 3. Create business case for additional traffic data needs.	Divisions, Planning, & Asset Mgmt	Workstream
2b	Define data needs to measure mobility for other modes	Once mobility measures are set for each mode define data needed for analysis.	Continue effort in Item A1b. by also discussing data needs for each modal mobility measure.	Ferry, Rail, Public Transportation, Aviation, Bike & Ped,	
3a	Baseline mobility then set mobility targets for highways by tiers.	Once the measure is set baseline data must be collected to determine our current mobility level of service. After that comes the important task of setting performance targets for mobility. A thoughtful analysis must be done by tier to define the correct goal for each level of our network. These targets will then be used to define the mobility "needs" for our transportation network. These are the standards by which our network will be judged that will allow us to	1. Use best available data to baseline mobility measures by Tiers, by Divisions and by modes. 2. Assemble affected stakeholders to set mobility goals by tiers. 3. Establish associated manager and BU mobility metrics. 4. Populate "Efficiently" dashboard gauge. Begin to work towards automating process.	Pre-Construction, Traffic Engineering, Divisions, Planning, Asset Mgmt, Work Zone Traffic Control Unit, ...	
3b	Baseline then set mobility targets for other modes.	<ul style="list-style-type: none"> <li>Quantify the difference between our needs versus our resources available to meet those needs.</li> <li>Create Business Unit and manager metrics that support these goals.</li> <li>Feed NCDOT dashboard "Mobility" gauge</li> <li>Begin to prioritize mobility needs.</li> <li>Begin to educate internal and external stakeholders on the concept of mobility.</li> </ul>		Ferry, Rail, Public Transportation, Aviation, Bike & Ped,	

B. Congestion Management Toolbox					
1	Create an all encompassing, living document that provides multimodal mobility improving strategies which includes the what, when, how, and	<p>Widening and new location are not the only strategies that improve mobility. However, those who currently plan and develop projects for NCDOT may not be aware of other strategies or the benefits associated with them.</p> <p>A multitude of strategies such as Ramp Metering, Congestion Pricing, etc. exists today for improving mobility. By housing information on these strategies in one easily accessible (on-</p>	<p>1. Contract ITRE/grad students to research and compile strategies into a living document.</p> <p>2. Educate NCDOT planning and design community on the capabilities and intended use of the toolbox.</p> <p>3. Develop and implement process for</p>		

	expected benefit/cost for strategies that address recurring and non-recurring congestion.	line?) location, it becomes more likely that these strategies will be used to meet our mobility needs.  As new technologies are introduced and more results based information becomes available on previously documented strategies, the document must be updated/refreshed to incorporate the new information. NCDOT staff attendance at industry events such as I-95 Corridor Coalition, ITS America and AASHTO Operations Academy are essential to ensure that we are aware of the most current technologies and real world results of their implementation.	updating "Toolbox" annually, which includes sending key positions to annual industry events and educational opportunities.		
2	Standardize on mobility analysis tools.	Currently no overarching framework exists from which to analyze mobility by tiers. An existing research project (Statewide Truck Model) could be enhanced to enable a quantitative (and potentially multimodal) analysis of travel demand (passenger and truck trips) and mode choice scenarios on the statewide tier. This will result in better defining current/future deficiencies and long-term mobility needs from a network perspective.  Once applicable mobility enabling strategies have been identified, a consistent method to analyze the effectiveness of the alternatives is also needed. Tools such as Dynasmart, IDAS, etc. should be considered.	1. Evaluate and select traffic analysis tools. 2. Draft guidance document to ensure consistent usage. 3. Provide training to appropriate personnel.		
<b>C. Systems Management:</b> This recommendation speaks to needing to create "Systems Planning" and "Systems Operations" groups within NCDOT. The challenge in doing this is to find a way to have them be plugged into the parts of the process they represent, yet be closely enough aligned so that they share technical expertise and routinely involve each other in information sharing and decision making. To this end, it appears they should be housed under one manager so that the commonality of their function is more important than the diversity of their input into the "process". This would be similar to many functions that exist throughout NCDOT today that serve both pre-construction and operations functions. The key is to mainstream this group into planning, design, operations and assessment for mobility.					
1	Create a multi-modal "Systems Planning" function within NCDOT	See Below.	1. Create a central Systems Planning function and a Transportation Planning function within each Division. 2. Create metrics for both functions. 3. Using the outcome of the "Measuring Mobility" task above analyze and prioritize mobility needs by tier with appropriate inputs; include both		TMT Planning Workstream

			current, 10 and 30 year analysis. 4. Work with TMT Strategic Planning & Prioritization Workstream to gain MPO and local government stakeholder input into process and content of solutions.		
<p>To meet mobility needs in North Carolina we must establish a process to incorporate multi-modal and multi-faceted solutions based on recurring assessments of the mobility needs in our state by tier. This must include looking at the needs of all transportation customers including citizens, businesses and freight. (This task should include building on the outcome of the Statewide Logistics Planning effort currently underway by OSBM through ITRE.) This group must prioritize the mobility needs of the state based on the targets and data defined above.</p> <p>Outputs from the development of mobility needs should inform the Departments biennial Strategic Planning and Needs (SPAN) report for Infrastructure and Business Unit mobility needs and SPOT's efforts to program resources to meet NCDOT's mobility goal of moving goods and people more efficiently. These analyses must be done in the near term to inform project decisions and the Comprehensive Transportation Plan (CTP), and in the longer term to inform policy and programmatic decisions.</p> <p>To maximize the effectiveness of currently fragmented approaches to improving mobility that occur in the Highway, Ferry, Rail and Public Transportation Divisions, Transportation Planning, PD&amp;EA and Traffic Engineering a new tiered approach to mobility planning should be considered. <u>This approach is based on local awareness of needs and centralized expertise of possible solutions.</u> (For simplicity, in this model the 14 geographical multi-modal Divisions would include all transportation functions that occur within in the current 14 DOH Operations Divisional boundaries.) Different groups would be responsible for mobility on different multi-modal tiers as follows:</p> <ul style="list-style-type: none"> <li>• Statewide Tier: Central Systems Planners solicit input into analysis from all modes to improve mobility on the statewide tier. Analysis will be done by logical subsets of the network, especially key corridors, focusing on the needs of inter-regional and interstate traffic. In this case a statewide perspective of need would be used with local representation of needs factored in as well.</li> <li>• Regional Tier: Central Systems Planners work with multi-modal NCDOT representatives and local transportation stakeholders in each of 14 geographical multi-modal Divisions to develop solutions cooperatively. In this case, a regional perspective of needs would be used as defined by the geographic boundaries of one or more Divisions. Analysis will be done by logical corridor groupings focusing on meeting regional mobility needs.</li> <li>• Sub-Regional Tier: Central Systems Planners provide technical assistance to Divisions and modal administrations as they prioritize mobility needs based on local input and awareness within their areas. Analysis will be done by logical local regions focusing on the needs of local traffic.</li> </ul> <p>Using the "Toolbox" identified above and consulting with the Systems Operations group noted below Systems Planners will identify phased multi-modal capital and operational solutions needed to meet the system performance targets for mobility. These solutions must include a sequential look at all approaches to improving mobility through</p> <ul style="list-style-type: none"> <li>• increasing connectivity,</li> <li>• optimizing existing capacity,</li> <li>• decreasing or managing demand,</li> <li>• and/or increasing capacity.</li> </ul> <p>They will analyze the solutions for cost-effectiveness using the analysis tool selected above in the context of an overall "Asset Management" approach.</p>					

<p>This group will also</p> <ul style="list-style-type: none"> <li>• Have input into the Draft Recommendations stage of the Consolidated Transportation Planning process.</li> <li>• Have input into the project development process for projects<sup>1</sup> that affect mobility at each critical stage: NEPA Process (especially Purpose &amp; Need definition, Scoping and Alternatives Analysis), Design (especially work zone phasing, contract approach, coordinating project scheduling and detouring), and Construction Engineering (to assist with technology items that are outside the scope of traditional highway projects).</li> <li>• Assess and document the contributions of various mobility improvements once they are implemented. This will allow true ROI analysis to enable more informed future investment decisions about similar mobility needs and implementations.</li> <li>• Work with the marketing function within the Department to better manage the short and long term mobility expectations of our citizens and legislators and help NCDOT employees and the Board of Transportation better understand the concepts, approaches and value of mobility. Possibilities include creating an annual *mobility report card* for Strategic Highway Corridors. This is above and beyond the Dashboard and could be used to showcase how we used the "toolbox" to solve mobility problems in key corridors over time (such as shifting X% of freight from a hwy to parallel rail corridor).</li> <li>• Maintain the NCMIN route inventory (all modes).</li> <li>• Be the ultimate source of Mobility assessments for the Department (similar to SRMU's administration of the MCAP process for the "lasts longer" goal) that will feed the dashboard, PDA's, etc.</li> </ul>					
2	Create a "Highway Systems Operations" function within NCDOT		<ol style="list-style-type: none"> <li>1. Gather affected stakeholders to discuss issues with current approach.</li> <li>2. Develop recommendations for possible realignment of functionalities and associated metrics.</li> <li>3. Baseline 2007 data by Division and create tracking mechanism for Mobility related Operations Performance Measures.</li> </ol>	Pre-Construction, Traffic Engineering, Divisions, Planning, Asset Mgmt, Work Zone Traffic Control Unit, ...	

<sup>1</sup> While it might seem overwhelming today to think that a small group of individuals could have input into the thousands of "projects" that make up the TIP, over time as projects more closely align with our goals this process will become more systematic and therefore more manageable.



To maximize the effectiveness of currently fragmented approaches to Highway Systems Operations that occur in DOH Divisions, Operations and Traffic Engineering the following highway functions should be combined and better aligned to meet NCDOT's mobility metrics. This approach will lead to "intense and consistent management of the system"<sup>2</sup> as a major source of mobility improvement.

- Freeway Lane Management (includes HOV, Ramp Metering, Toll Collection, etc.)
- Incident Management (includes Emergency Responder coordination)
- Traveler Information (includes traffic detection)
- Road Weather Management
- Work Zone Management (includes Work Zone Safety & Mobility, Law Enforcement role)
- Emergency Management
- Commercial Vehicle Ops (includes OS/OW Permits, Weigh Stations, Truck Parking, FMCSA Issues and Freight Management)
- Arterial Management (includes Signal Management and Access Management)
- Transportation System Security
- Safety & Crash Prevention Systems
- Effects of geometric features on traffic operations

To accomplish this would require a number of positions that do not currently exist today.

- Upgrading two TEIII to TES I (Traveler Information and Incident Management)
- Adding 5 Transportation Engineer II 's (Programs & Policies, STOC Operations, TIMS & 511, Emergency Management & Transportation Security, Commercial Vehicle Operations)
- Adding 2 Transportation Engineer I's (IMAP and Device Operations & Maintenance)
- Adding 1 Transportation Technician (Program Support)
- Adding Positions for Program Assistant, Outreach, IT Support, etc.

These functions should be supported 24x7x365 as follows

- Statewide Tier: by the Statewide Transportation Operations Center (STOC)
- Regional Tier: by 3 Regional Transportation Management Center, backed up by the STOC
- Sub-Regional Tier: by the 14 Highway Division Offices, backed up by the 3 Regional TMC's and ultimately the STOC.

These operations should build on the findings and recommendations of NCDOT's Work Zone Safety and Mobility policy, but broadened to include other incidents outside of Work Zones and day-to-day traffic management strategies.

To begin to mainstream "Operations" into the Division of Highways this group should

- Create Regional Mobility positions that report centrally, similar to the regional presences in Traffic Engineering and Construction. These will have very complimentary missions to the Regional Traffic Engineers and the Regional ITS Engineers and these interfaces must be clearly defined.
- Develop selection criteria and manage the process of selecting candidates for the AASHTO Operations Academy with the goal of sending 2 NCDOT employees each year.
- Create a "module" on the Transportation Engineering Associates rotation so that each TEA spends time working with this group and specifically at the STOC during their Training

<sup>2</sup> AASHTO's "The 21<sup>st</sup> Century Operations-Oriented State DOT", July 2006.

Program.

- Work with Talent Management Workstream to identify career paths for Mobility related functions.

## 2. Systems Operations – Short Term

### Arterial Management

1	Ensure adequate technical support to meet performance levels for Traffic Signal maintenance.		<ol style="list-style-type: none"> <li>1. Assess gaps and risks in current approach</li> <li>2. Create matrix of possible solutions to address needs; include contracting out signal maintenance, perhaps by corridor, additional signal tech positions, etc.</li> <li>3. Present analysis and options to affected stakeholders for decision.</li> <li>4. Create and include signal maintenance metrics in the PDA of the staff who are ultimately responsible for this item.</li> </ol>	Traffic Engineering, Divisions	Greg Fuller
<p>Once appropriate measures are in place to quantify our ability to move people and goods more efficiently lagging indicators such as signal maintenance will be less necessary. In the meantime, specific preventive maintenance (PM) activities should be done at 6-month and 12-month intervals to maintain the efficiency and reliability of traffic signal operation, which improve mobility. Failure to do adequate PM also results in a more costly emergency maintenance approach to signal maintenance.</p> <p>According to 2007 data, the current staff of NCDOT signal technicians are only able to complete 78% of the 12-month preventive maintenance activities and 31% of the 6-month preventive maintenance activities on the 5,603 traffic signals for which they are responsible. As a result, there were almost 6,000 emergency maintenance responses to these traffic signals during the year. In addition, the number of traffic signals is increasing at about 250 annually. The increasing number of Closed Loop Systems require more troubleshooting to properly diagnose and repair communication failures. Signal Technicians are also maintaining other ITS devices such as CCTV cameras, dynamic message signs, etc. Signal Technicians are not able to devote all their time to maintenance activities as they must also inspect and approve all new or upgraded signal installations by developers and contractors.</p> <p>NCHRP Synthesis 245 survey found that a single maintenance person could maintain 38-43 traffic signals. The ITE Traffic Control System Operations Manual, from a review of survey information, indicates that a single maintenance person can maintain 40 to 50 traffic signals or other field devices. Currently NCDOT traffic signal technicians maintain an average of 63 signals each.</p>					
2	Ensure adequate technical support to meet performance levels for systematic evaluation and optimization of existing Closed Loop Signal Systems.	<p>Optimizing traffic signal timing is a cost-effective strategy for "moving goods and people more efficiently". FHWA estimates that the benefit-to-cost ratio for signal timing optimization projects approaches 40 to 1. Again, until lagging indicators for mobility are created, leading indicators such as signal timing will begin to address the needs.</p> <p>According to the most recent figures, the current Division staff is only able to retune 24% of the traffic signals annually for</p>	<ol style="list-style-type: none"> <li>1. Assess gaps and risks (including prioritized tiered focus) in current approach</li> <li>2. Create matrix of possible solutions to address needs; including central, regional or Divisional signal timing staff</li> <li>3. Present analysis and options to affected stakeholders for decision.</li> <li>4. Create and include signal system</li> </ol>	Traffic Engineering, Divisions	Greg Fuller

		<p>which they are responsible. We currently have approximately 163 Closed Loop Signal Systems with 1114 signals. There are an additional 86 Closed Loop Systems with 533 signals in the design, construction, or implementation stage.</p> <p>Systems should be evaluated and optimized every 18 months and sooner on high growth corridors.</p> <p>Use of the new "Division Traffic System (DTS)" software should greatly enhance the ability to manage and measure traffic signal system performance.</p>	<p>performance maintenance metrics in the PDA of the staff who are ultimately responsible for this item.</p>		
3	Manage access with clear and consistent expectations using the NCMIN framework	<p>Access management is critical to the efficiency and reliability of a facility. Well-managed access can improve mobility, while poorly managed access can degrade safety and reliability. Many people at various levels in NCDOT make access decisions on a daily basis. Access to the state's highway system should be managed in appropriate manner using the NCMIN framework, with clear and consistent expectations and applications throughout the state. The NCDOT Driveway Manual provides a good foundation that can be built upon within a broader framework of more comprehensive access management.</p>	<ol style="list-style-type: none"> <li>1. Define access management strategies by tiers to enable meeting mobility metrics.</li> <li>2. Define how access requests/changes will be reviewed to ensure compliance.</li> <li>3. Update the Driveway Manual to reflect changes. (Change name to Access Manual?)</li> <li>4. Create materials that show the benefits of improved access management for stakeholders.</li> <li>5. Update BOT Access Management Policy</li> </ol>	Traffic Engineering, Transportation Planning, Chief Engineer's Office, Divisions	
<p><b>Freeway Management – The current Freeway Management Program in NC has remained relatively unchanged over the last 5 years despite increasing traffic volumes and incidents. The data collection and base lining effort beginning in May of 2008 that needed for shared metrics on PDA's will allow us to identify the programmatic gaps that are keeping us from meeting our mobility goals. We trust that this analysis will support the following recommendations:</b></p>					
1	Develop and implement plan with SHP to improve incident clearance times on Interstates.	<p>Incidents account for over 60% of congestion. Detection, response and clearance of incidents is handled by law enforcement and other emergency responders. To decrease the congestion resulting from incidents law enforcement must understand their role and agree to work towards reducing incident clearance times to improve mobility. Related issues include towing, abandoned vehicles on shoulders, incident notification to NCDOT and incident management by local law enforcement on Interstate routes.</p> <p>Will require good definition of roles and responsibilities</p>	<ol style="list-style-type: none"> <li>1. Develop and implement agreement with SHP concerning incident clearance</li> <li>2. Make necessary changes at NCDOT to support SHP agreement.</li> <li>3. Begin tracking and reporting Interstate incident clearance times by Division. Begin with baseline of 2007 data.</li> </ol>	Chief Engineer's Office, Divisions	Lacy Love, Jon Nance, Kevin Lacy, Brian Purvis

		between Division Incident Management and Maintenance and standardized IMAP training. Consider separating 24x7 Incident Response from other 8-5 Maintenance functions and addressing "Emergency Call Back Pay Issues" that prevent timely after hours NCDOT response.			
2	Expand IMAP coverage to all 1200 miles of North Carolina's interstate system on a 24x7x365 basis.	IMAP provides quicker response to incidents, which cause over 60% of all delays. National studies indicate benefit to cost ratios of 2:1 to 36:1. Quick and effective response also reduces secondary incidents.  IMAP may look different in urban and rural areas and during peak and non-peak periods.	1. Develop a 2-page plan to implement IMAP on all Interstate 24x7x365; include options of state employees, contracted employees and contracted services. Include statement of B/C for each. 2. Present findings to stakeholders for discussion and implementation	Chief Engineer's Office, Divisions	Brian Purvis, Melvin Dorsey, Roger Ayers, Archie Wells
3	Begin to grow STOC functionality		1. Meet with Director of Field Operations, Asset Management and Divisions to gain consensus on STOC functionality statewide. 2. Create and fill STOC Manager Position. 3. Work with Divisions and other agencies to develop procedures. 4. Train staff and implement new procedures.	Chief Engineer's Office, Divisions	Jo Ann Oerter, RITS Engineers, Division Operations Engineer Rep
<p>To improve mobility NCDOT has made a significant investment in Traffic Management infrastructure across the state including cameras, detectors, Message Signs, etc.. In the largest urban areas, Traffic Management Centers manage these devices typically from 6 AM to 9 PM, Monday – Friday. At other times and in other areas of the state there is a responsive approach to traffic management; i.e. "on-call" employees respond to incidents nights and weekends.</p> <p>Recognizing that incidents occur 24x7 and to enable a more customer service oriented response the Statewide Transportation Operations Center will be the 24x7x 365 central hub for statewide incident notification and traveler information. It will SUPPLEMENT existing local points of contact for emergency responders to make contact with NCDOT. When regional TMC's are closed or not have not yet been created the STOC can provide proactive traffic management. It will monitor traffic cameras, probe and sensor traffic flow data, SHP CAD feeds, citizen reports of incidents and alert NCDOT forces to begin responding.</p> <p>When the joint DOT/EM/SHP STOC facility is in place i(+/-2010) this functionality will be significantly enhanced. In the interim, we can create operational procedures to begin effective coordination in all 100 counties.</p> <p>Fully implementing STOC functionality will require addressing TMC and Incident Management staffing issues within the Divisions, especially call back procedures including Emergency Call Back Pay issues, taking IM vehicles home, strategically staging emergency response equipment, etc.</p>					

## **IV. Planning for Mobility**

To improve mobility, NCDOT must look to new approaches. The solution lies in taking a performance results-based approach to improve mobility by effectively planning for and analyzing both recurring and non-recurring congestion at multiple levels:

- Statewide level – evaluating mobility on the entire network, looking at the state as a whole
- Regional level – evaluating mobility within a regional area
- Corridor level – evaluating mobility along major corridors, within or transcending different regions
- Local level – evaluating mobility along major local streets

Analysis at each level should include an implementation component, which addresses both long-term and short-term solutions. Solutions should come from a dynamic multimodal toolbox that provides mobility strategies for addressing recurring and non-recurring congestion.

### **Statewide Mobility Planning**

Planning for statewide mobility focuses on the entire network, looking at the state as a whole. At this level, specific facilities are not analyzed. Recommendations focus on assessing needs and developing programs, strategies and policies to improve mobility and reduce congestion (both recurring and non-recurring). Examples include developing a control of access program and a right-of-way preservation program. Statewide level analysis would include evaluating new and emerging issues and solutions, such as new Intelligent Transportation System (ITS) technologies.

The Department does not currently have resources dedicated to evaluating and recommending strategic mobility solutions at the statewide level; it is therefore recommended that dedicated resources be assigned with this responsibility.

### **Regional Mobility Planning**

Planning for regional mobility focuses on a particular region, which can be a metropolitan area, a metropolitan planning organization area, a county, or even a small urban area. The outputs of the regional level of analysis are Long Range Transportation Plans (LRTPs) and Comprehensive Transportation Plans (CTPs).

These plans provide long-term solutions on specific facilities to improve mobility in the region for the next 30 years. Currently, solutions in LRTPs and CTPs focus on recurring congestion, primarily through the use of additional highway capacity (widening and new location solutions) and public transportation. However, operational solutions, such as access management, managed lanes, traveler information systems, or ramp metering (which address both recurring and/or non-recurring congestion) should be incorporated into these plans to effectively plan for improving mobility.

The Transportation Planning Branch leads the Department's efforts in planning for regional mobility, through coordination with MPOs, RPOs, municipalities, and counties on the development of LRTPs and CTPs. However, the Department does not currently have a formal approach for evaluating and recommending operational solutions, which address recurring and non-recurring congestion into LRTPs and CTPs. Therefore, it is recommended that a formal process and a dynamic mobility toolbox be created, with the appropriate resources dedicated to this effort.

### **Corridor Planning**

Corridor planning comprises the analysis of existing and future deficiencies/needs (both recurring and non-recurring) along a corridor between logical origin/destination points (usually larger than individual project termini). Outputs of corridor plans include short-term and long-term solutions (possibly including designs) for addressing deficiencies, implementation plans, and agreements between affected parties. Corridor planning should be multimodal, depending on the specific corridor.

Corridor planning should occur on both Statewide and Regional Tier facilities to help ensure consistent service and expectations across statewide and regional corridors. Successful corridor planning brings all affected parties to the table to develop a plan and course of action that addresses current and expected deficiencies. This effort will help prevent piecemeal and localized decision-making that can negatively affect service and safety for the traveling public and movement of goods along a corridor.

Corridor Study recommendations should include reasonably manageable projects. Once TIP funding is identified and programmed for a project, an accurate cost estimate can be developed based on the Study recommendations. This cost estimate will better reflect the needed improvements and help minimize future cost increases due to "scope creep." In addition, Corridor Study recommendations will aid in project scope and analysis, since the recommendations will have been through a prior advanced planning analysis, received approval from affected parties, and shared with the public. This could aid in streamlining the project delivery process.

The Department does not currently have resources dedicated to evaluating and recommending mobility solutions at the corridor level (on either the statewide or the regional tiers). Therefore, it is recommended that dedicated resources be assigned with this responsibility.

### **Local Mobility Planning**

While planning for mobility at the local level is the lowest level of analysis, often it can be the most critical. A well-designed, interconnected local transportation network (subregional tier) is critical to achieving a high-level of mobility on statewide and regional tier facilities. When congestion occurs on these two tiers, the traveling public often uses subregional tier facilities to reach their destination. The reverse is also true. If an area has a poorly functioning subregional tier network, the traveling public is often forced to use higher tier facilities, potentially resulting in additional congestion problems.

Planning for mobility at the local level is typically performed by the local area in coordination with a regional entity, such as an MPO or RPO, and NCDOT. Most often the analysis focuses on recurring congestion as any incidents on the subregional tier are local in nature. It is recommended that this approach continue as is.

The following tables outline the activities associated with each analysis level and provide examples.

### Recurring Congestion

System Level	Activity	Example Output
<b>Statewide</b>	<i>Develop Programs, Strategies and Policies to improve mobility</i>	<ul style="list-style-type: none"> <li>Travel Demand Management Program</li> <li>Access Management Manual/Policy</li> <li>Control of Access Program</li> <li>Right-of-Way Preservation Program</li> </ul>
<b>Regional</b>	Develop regional and area plans and policies to improve mobility	<ul style="list-style-type: none"> <li>Long-Range Transportation Plans (LRTPs)</li> <li>Comprehensive Transportation Plans (CTPs)</li> <li>Regional Signal System Plans</li> <li>Corridor Protection Tools in Local Land Use/Development Ordinances</li> </ul>
<b>Corridor</b>	<i>Develop Corridor Studies to improve mobility along major corridors between logical origin and destinations</i>	<ul style="list-style-type: none"> <li>Rail Corridor Plans (SEHSR, SE NC, Western NC)</li> <li>Statewide Tier Corridor Plans (includes Freeway and Arterial Management Plans)</li> <li>Regional Tier Corridor Plans</li> <li>Memorandums of Agreement</li> </ul>
<b>Local</b>	Develop local street and collector plans to improve mobility	<ul style="list-style-type: none"> <li>Collector Street Plans, Arterial Management Plans</li> </ul>

### Non-Recurring Congestion

System Level	Activity	Example Output
<b>Statewide</b>	<i>Develop Programs, Strategies and Policies to improve mobility, including the use of emerging technology</i>	<ul style="list-style-type: none"> <li>Statewide Traveler Information Plan</li> <li>Statewide Incident Management Plan</li> </ul>
<b>Regional</b>	Develop regional and area plans and policies to improve	<ul style="list-style-type: none"> <li>Regional ITS Strategic Deployment Plans</li> </ul>

	mobility	<ul style="list-style-type: none"> <li>▪ Regional Incident Management Plans</li> <li>▪ Regional Event Management Plans</li> </ul>
<b>Corridor</b>	Develop Corridor Studies to improve mobility along major corridors between logical origin and destinations	<ul style="list-style-type: none"> <li>▪ <i>Statewide Tier Corridor Plans (Corridor Incident Management Plans)</i></li> <li>▪ <i>Work Zone Transportation Management Plans</i></li> <li>▪ <i>Memorandums of Agreement</i></li> </ul>
<b>Local</b>	Develop local street and collector plans to improve mobility	

*Note: Formal process and defined roles and responsibilities do not exist comprehensively for the items in italics*

In order to provide a high-level of mobility and meet the transportation needs of the state, **it is recommended that the Department have dedicated resources for planning for mobility at each system level.** While some of these functional areas and associated activities currently exist, there are areas where mobility planning is not occurring, with the most noticeable gap at the statewide and corridor levels. While some statewide and corridor mobility planning is happening on an ad-hoc basis, the Department lacks a formal process with defined roles and responsibilities.

### **Recommendations**

The primary recommendation is to create a Statewide Mobility Planning Group (SMPG) to oversee the activities below. This new group would be a co-owner of the Department's mobility performance metrics, with the Mobility and Safety Division.

#### **Develop Programs, Strategies and Policies at the Statewide Level**

The SMPG would be the lead group responsible for developing, monitoring, and managing programs, strategies, and policies to improve mobility at the statewide level (for both recurring and non-recurring congestion). The SMPG would work with other Business Units in developing and implementing these strategies. For example, the SMPG would work with the Mobility and Safety Division on the creation of 1) a Department-wide Access Management Program and Policy based on the North Carolina Multimodal Investment Network (NCMIN) framework, 2) a Statewide IMAP plan, and 3) a Statewide Traveler Information Plan. Similarly, the SMPG would work with the Public Transportation Division on any expansion of the Travel Demand Management program.

Resources Needed: One FTE



### **Provide Technical Assistance in the Development of Regional Plans**

The SMPG would provide technical assistance to the Transportation Planning Branch (TPB) and the proposed Division Planning Engineers on evaluating and recommending operation solutions which address both recurring and non-recurring congestion into CTPs and LRTPs. The SMPG would provide guidance and training to TPB staff on a mobility toolbox and act as a liaison between TPB and technical experts in the Mobility and Safety Division (the Mobility and Safety Division would create and maintain the toolbox). The toolbox is envisioned as a comprehensive, living document that provides multimodal mobility improvement strategies. These strategies would include the what, when, how, and expected benefit/cost in regards to recurring and non-recurring congestion (e.g., operational solutions such as ramp metering, speed harmonization, etc.). This toolbox would be updated annually to ensure the Department is assessing “cutting-edge” strategies. In addition, the SMPG would provide guidance to TPB staff to incorporate the Strategic Highway Corridors Vision Plan recommendations into CTPs and LRTPs.

Resources Needed: Activity to be handled by group as a whole (no FTE specifically dedicated)

### **Conduct Statewide Tier Corridor Studies**

The SMPG would be responsible for leading the development of multimodal corridor studies on the Statewide Tier. The goal is to analyze all Statewide Tier facilities (primarily highways and rail) over time to address mobility and related needs (such as freight movement), with updates on an as needed basis. Studies would be prioritized using a combination of quantitative and qualitative data.

The actual studies could be managed by NCDOT, MPOs, or other regional organizations, while NCDOT or consultants perform the analysis. Each study would be guided by a team composed of all affected parties along the corridor, including at a minimum the local government entities and appropriate NCDOT staff. The SMPG would be the NCDOT lead on all studies, with assistance from other NCDOT Business Units (such as the Mobility and Safety Division, or the Rail Division) to provide expert knowledge, as appropriate. Each study would at least include:

- Long-term and short-term solutions, which would consider input from the affected parties and the general public. These recommendations would be scoped into manageable projects which are fed into the Mobility Program project prioritization process.
- A phased implementation plan which recommends improvements and actions that should be undertaken
- Agreements between affected parties to ensure study recommendations are incorporated into state, regional, and local plans and procedures. For example, following the completion of studies, recommendations should immediately be incorporated into CTPs to ensure users are aware of the plans for the corridor studied.

Study teams would continue to meet as needed following the completion of a study to help ensure recommendations are followed, allowing for changes if necessary.

In addition to Statewide Tier corridor studies, the SMPG would lead the Department's participation in any national or regional corridor studies, such as the I-95 Corridors of the Future program.

The SMPG would assist the Preconstruction Division on Statewide Tier Mobility projects. The SMPG would provide guidance and information related to the Statewide Tier (and/or Strategic Highway Corridors Vision Plan) and recommendations on projects resulting from Corridor Studies during the project development process.

The SMPG would also evaluate the appropriate tools (such as a Statewide Travel Demand model) and/or software needs (such as IDAS and Dynasmart) for analyzing each corridor and prioritizing projects in the Mobility Program.

Resources Needed: Two FTEs to conduct up to six Corridor Studies at a time

### **Provide Technical Assistance in the Development of Regional Tier Corridor Studies**

It is recommended that Regional Tier Corridor Studies be led by the Transportation Divisions, given these facilities are more regional in nature (for example, Division 5 would be the lead NCDOT Business Unit on a corridor study on NC 55 between Durham and Fuquay-Varina). However, the SMPG would provide guidance and training on conducting such studies. Similar to Statewide Tier studies, the actual studies could be led by NCDOT, MPOs, or other regional organizations, while NCDOT or consultants could perform the analysis. Each study would be guided by a team composed of all affected parties along the corridor, including at a minimum, the local government entities and appropriate NCDOT staff. Recommendations from Regional Tier Corridor Studies would be incorporated into CTPs.

Resources Needed: Activity would be handled by FTEs working on Statewide Tier Corridor Studies. The Regional Tier Corridor Studies should be led by the proposed Division Planning Engineers.

### **Prioritize Mobility Projects on the Statewide Tier**

The SMPG would be a co-owner of the Department's mobility performance metrics, with the Mobility and Safety Division. Together, these groups would be responsible for prioritizing all solutions within the Department's Mobility Program on the Highway Element of the Statewide Tier. Mobility solutions are defined as projects that improve mobility, increase capacity, reduce bottlenecks, reduce congestion (both recurring and non-recurring) and/or improve efficiency of the transportation network. Sample projects include widening, new location, reconstruction of an intersection to a superstreet, installation of ramp meters, signal synchronization, installation of dynamic message

signs and traffic cameras, etc. Since the SMPG will be the lead group on Statewide Tier Corridor Studies where the majority of projects would originate, it is recommended that the SMPG be the lead group for prioritizing projects in Mobility Program. The SMPG would also be consulted as the non-highway modal divisions lead their respective prioritization efforts.

The SMPG would develop a formal project prioritization methodology (with defined roles and responsibilities) which includes both a quantitative and qualitative approach, with assistance from the Strategic Planning Office of Transportation (SPOT). A data-driven scoring tool would be used for the quantitative component, with the qualitative component including collaboration with other Business Units such as the Mobility and Safety Division and the 14 Transportation Divisions. Within the Mobility Program umbrella, other programs may exist, such as a Spot Mobility and Bottleneck Reduction program, or an Upgrade-Intersection-to-Interchange program. The Mobility and Safety Division may be the lead group for prioritizing projects in these programs.

Resources Needed: Activity to be handled by group as a whole (no dedicated FTE), as the prioritization process occurs on a biennial basis.

#### **Manage the North Carolina Multimodal Investment Network (NCMIN)**

The SMPG would be responsible for updating and coordinating any changes to the NCMIN, including any revisions to the SHC Vision Plan.

Resources Needed: Activity to be handled by group as a whole (no dedicated FTE), since changes are rarely expected.

#### **Overall Recommendation**

The SMPG will be essential in helping the Department meet our Mobility goal of making our transportation network move people and goods more efficiently. To ensure the highest probability of success with Mobility a key focal point, it is important that the SMPG have its own identity as a *separate and distinct* Business Unit. As the Department's lead group for developing, monitoring, and managing strategic statewide mobility plans, it is recommended that the SMPG be located within the Department's Transportation Strategy and Investment Analysis Function.

Four FTEs are recommended to adequately staff the SMPG (one Supervisor, three Engineers). These positions could be staffed from a reallocation of the Department's existing vacant positions. Each FTE would be assigned specific activities. The SMPG would function as a small team to address other tasks as needed.

While roles and responsibilities are broadly outlined in this document, they will need to be clearly defined if the SMPG is created, particularly between TPB, the Mobility and Safety Division, and SPOT.

## **V. TMT Mobility Workstream Members**

### Core Team

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### Other Participants

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